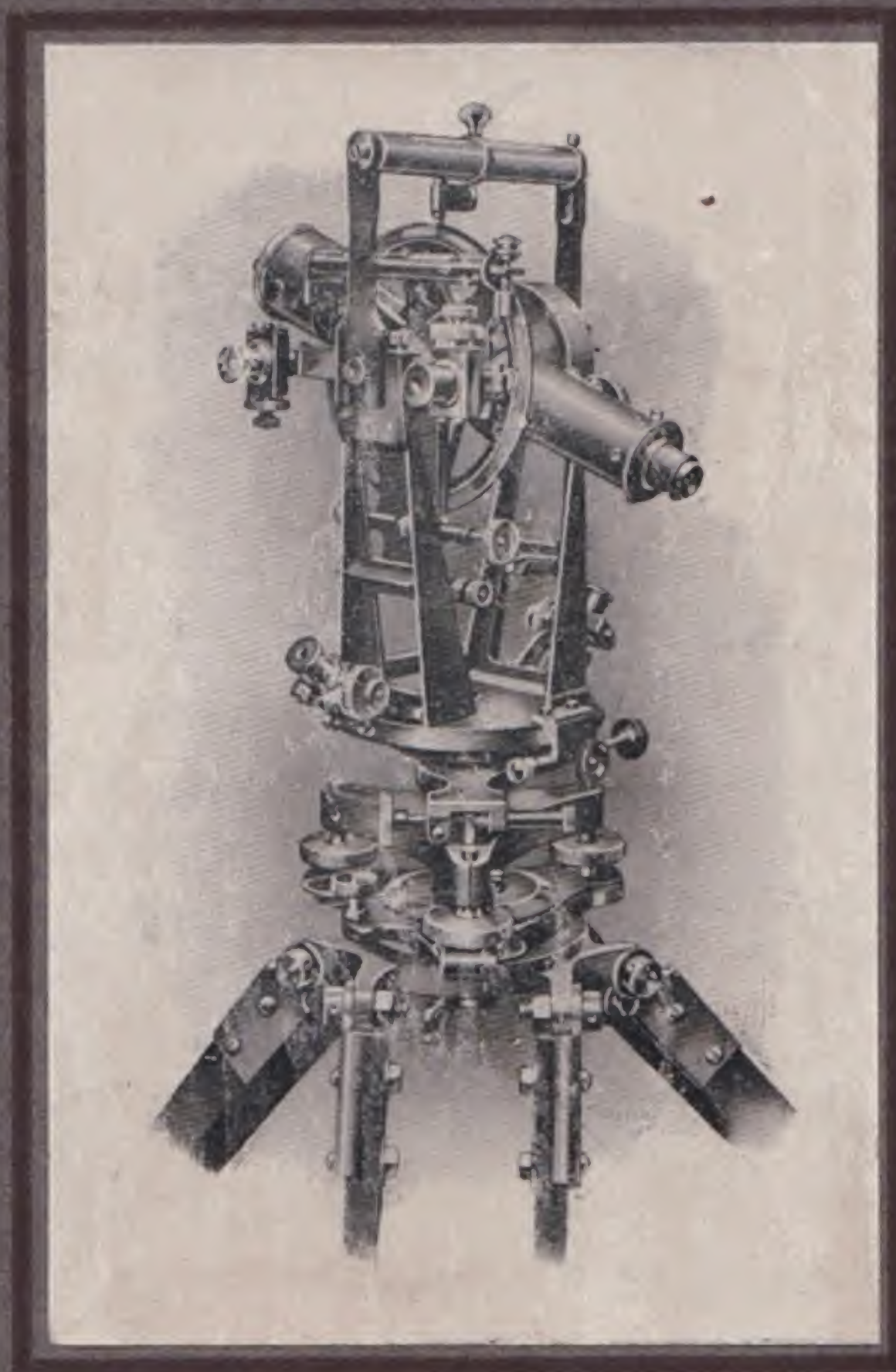


E. R. Watts & Son

123, CAMBERWELL ROAD, LONDON, Eng.

Manufacturers of Engineers' and Surveyors'
Instruments of Precision

Catalogue of
Engineers',
Surveyors',
Architects',



... and ...
Draughtsmen's
Instruments
and Supplies

CANADIAN BRANCHES:

200, WELLINGTON STREET, OTTAWA, ONTARIO

408, PORTAGE AVENUE, WINNIPEG, MANITOBA

INSTRUCTIONS to be observed when ordering

- 1.—All first orders should be accompanied by a remittance for the full amount, unless satisfactory references are sent. Foreign and Colonial Orders, unless placed through a London merchant, should be accompanied by a letter of credit on a London Bank providing for payment on presentation of shipping documents.
- 2.—The prices quoted in this list are *nett* and for delivery at our works, London. Packing and carriage extra at cost.
- 3.—In the case of Transits or Levels it is requested that the following particulars are sent with order:—
 - 1.—If Telescope is to be fitted with webs, lines on a glass diaphragm, or platinum iridium points.
 - 2.—If Stadia webs or lines are required.
 - 3.—How the instrument is to be graduated.
 - 4.—Whether three or four-screw levelling adjustment is required, also centering motion.
 - 5.—The type of tripod required.

Whilst we are always willing to make instruments to any specification or design, we would point out that any deviations from Standard Patterns necessarily add very greatly to the expense of production, and to the time of delivery.

Improvements are constantly being made, and the illustrations herein may therefore vary slightly as to detail.

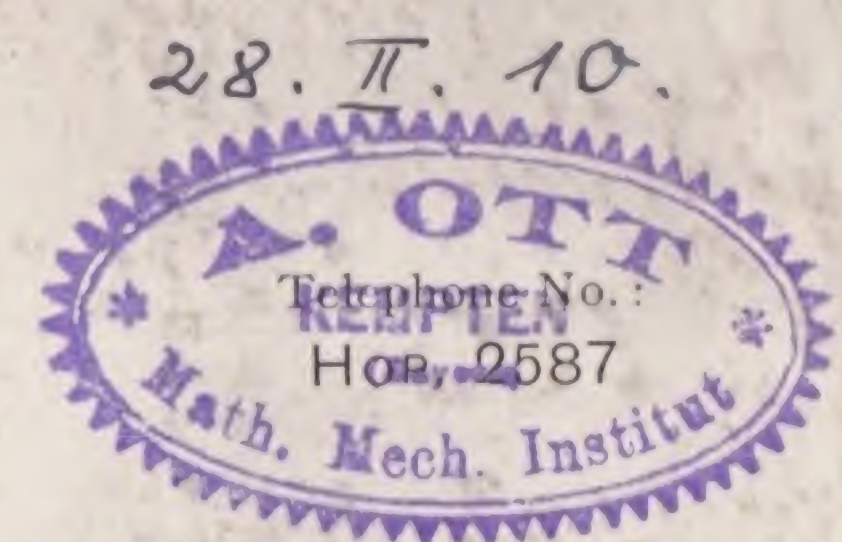
All Previous Lists Cancelled

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Established 1857



E. R. WATTS & SON

123, CAMBERWELL ROAD, LONDON, ENGLAND

CANADIAN BRANCHES

200, Wellington Street, OTTAWA, ONTARIO

408, Portage Avenue, WINNIPEG, MANITOBA

MANUFACTURERS OF SURVEYING AND OTHER INSTRUMENTS OF PRECISION

INSTRUMENTS are manufactured entirely at our London works under our personal supervision. They are of the finest material and workmanship, the highest possible finish, and of guaranteed accuracy. Great care has been taken to construct every part of the design and material to give the best results for the particular work required of it.

Graduations Particular attention is given to the graduating and centering of our Surveying Instruments, and the Automatic Dividing Engine which we have recently constructed at our works here is the finest and most accurate in existence. (See pages 4 to 7.)

Lenses We have also a department for the manufacture of Achromatic Telescope Lenses of the highest possible quality, and the work produced in this department will compare favourably with that of the leading opticians throughout the world.

Materials We have found, after long and careful experiment, that aluminium, or an alloy of aluminium, is unsuitable for the construction of Surveying Instruments, and, except in one or two unimportant details, we have entirely discontinued its use. By using a very tough gun metal and designing with as many parts as possible in one casting, the instruments are far stronger and more serviceable, and very little heavier, e.g., in all our Transits the two standards and the upper horizontal vernier plate are combined in one solid casting, thereby giving great strength and permanent rigidity with a minimum of weight.



Part of Fitting Shop



A corner of the first floor of Works Store

Axes

All inner horizontal Axes are constructed in a special hard alloy of bell-metal, while the intermediate Axes are made of phosphor bronze. These metals being dissimilar, a much "softer" horizontal motion is ensured than if they were both of the same metal. They also possess better wearing properties, and with ordinary care in use, a permanent fit is maintained. In the event of an Instrument being exposed to a severe blow it is better that the inner Axis should snap short off rather than bend, as, in the event of the latter occurring, considerable damage may be done to the Axis, and inaccurate readings may result, which might pass unnoticed for some time; while in the case of a snap the main centre only may be affected. Further damage resulting from continued use of the Instrument and inaccurate work are thus rendered impossible. In the alloy of which we make our centres these points have had careful consideration.

All Axes of our instruments are turned in specially-constructed "dead centre" lathes, so as to ensure their fit being absolutely concentric and "true" to one another.

Eyepieces

All Transits and Levels in this list will be supplied with Inverting Eyepieces, unless ordered otherwise, as we consider that the advantage of the increased light gained by the former, far outweighs any inconvenience resulting from an inverted object, and a surveyor soon becomes accustomed to working with this form of Eyepiece.

Diaphragms

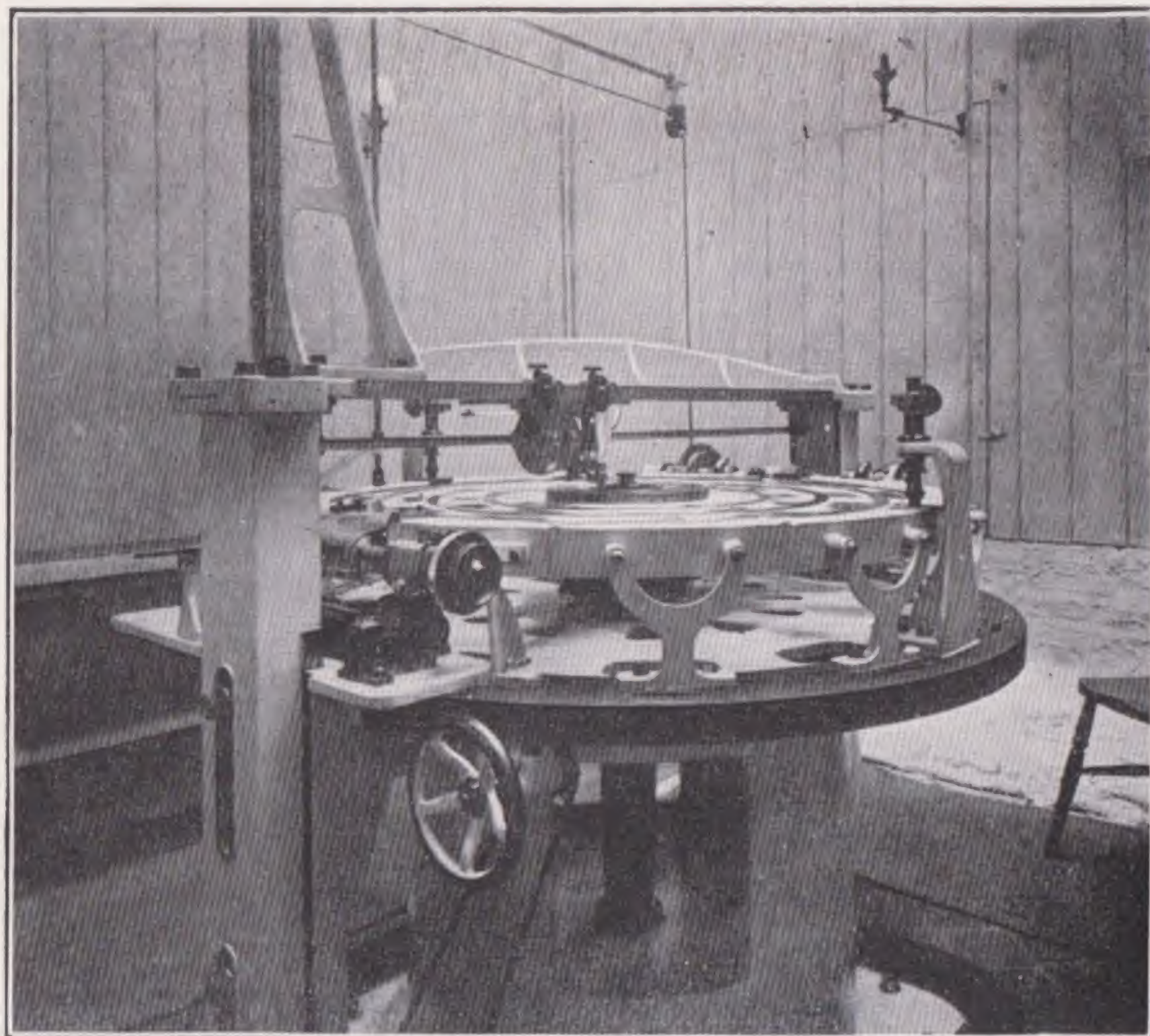
We make a speciality of Stadia Lines, both for our own instruments and those of other makers, and have recently brought our long and wide experience to bear in designing and constructing an improved machine for this purpose.

Spider web, glass, platinum wire, or point diaphragms can be supplied with any of our Transits or Levels without affecting the cost, but, unless otherwise ordered, spider web diaphragms will be sent with instruments, as, from our experience, we consider this diaphragm will give the best results, and with care will last many years.

The prices quoted in this list are strictly net cash, and will be found reasonable considering the high-class quality of our instruments.

ALL PRICES SUBJECT TO ALTERATION WITHOUT NOTICE

Automatic Circular Dividing Engine



The accuracy of the graduation of the circles of Theodolites being of such vital importance, it has been the aim of most of the first-class makers of Surveying and Astronomical Instruments either to procure or construct a Dividing Engine capable of producing graduations of the greatest possible degree of accuracy.

With this purpose in view, we recently constructed, at our London works, our large Automatic Circular Dividing Engine, an illustration of which appears above.

Over the construction of this machine neither time nor expense has been spared, over 18 months of close work being expended in its construction, a building of special design being erected to contain the machine, so as to eliminate as far as possible errors due to change of temperature, vibration, &c.

The machine is capable of graduating circles up to 4ft. 6in. in diameter, and weighs, complete, over two tons; the original graduation of the large circle alone occupied five months, the errors being reduced eventually to within 0.6 of a second.

In order to obtain a perfectly unbiassed and independent test of the degree of accuracy of the work done by this machine, we submitted a circle that we had graduated on it to the Imperial Physical Technical Institute at Charlottenburg, Germany, for testing. This Institute, which has a world-wide reputation, possesses a most complete set of apparatus for carrying out such tests with the greatest degree of refinement. Thinking the result of this test would interest users of our instruments and others, we submit herewith (see pages 6 and 7) a copy of the certificate we have received. We believe we are right in stating that **no other circle graduated on any other machine of this kind has given such accurate results.** On this machine all the circles of our instruments are graduated.

Extract from the well-known London Journal,

"The Times,"

dated 6th September, 1905, relating to our Dividing Engine

"THE WATTS DIVIDING ENGINE.—It is satisfactory to know that London now possesses probably as accurate a machine for the graduation of the circles of surveying and astronomical instruments as has ever been constructed. In general design and principle this machine is similar to the famous dividing engine of Messrs. Troughton and Simms. The present engine is, however, the work and property of Messrs. E. R. Watts & Son, who since 1857 have been engaged in the construction of astronomical and other instruments. The Watts Dividing Engine is entirely automatic. The circle to be graduated is exactly centred and clamped upon a horizontal revolving disc. This disc, or revolving table, has automatically to be rotated through successive small equal increments of arc. At the completion of each such increment the rotation ceases, and automatically a small engraving chisel at this instant of rest moves forward across the silver surface of the ring at that point, scratches a mark there, and then recedes. There are various devices for setting the machine to the required width of graduation; and there is also an automatic arrangement for stopping the machine when the last scratch has been cut. The main frame, in which the revolving table moves, is of cast iron; the revolving table and its spindle are of phosphor bronze, and weigh about 5 cwt. The whole engine weighs about two tons. The accurate fitting of the spindle into the oil-hardened steel collars is the only part of the work not carried out by Messrs. Watts themselves. It was accomplished by Messrs. Sir W. G. Armstrong Whitworth; and so truly did they set it that, when evenly lubricated, the revolving table was found to reverse accurately 180 deg. to within 0.15 of a sec. or arc. After the main frame and revolving table were fitted, the machine was securely bolted down on to an independent foundation. A light cut was then taken off the top face, edge, and centre recess of the revolving table *in situ*. Three rings of solid silver were now inlaid on the top face, near its outer edge, to receive the original graduations, which are the control divisions for all the work, and determine the success or failure of the machine. The original graduations were tested by means of seven micrometers, and were re-cut from tables of errors many times, until the *maximum* error of any one division did not exceed 0.6 of a second. There were 4,320 of these divisions, and the work of adjusting them occupied five months. From these graduations the teeth on the edge of the revolving table, which engage the endless screw of the rotating gear, were cut one by one. To avoid undue stress of the metal, and to maintain the keen edge of the V cutter, several cuts were taken, and the accuracy was checked by taking the mean of seven micrometer readings before any one of the teeth was cut. It may be taken, therefore, that the errors in the teeth are negligible. The process of cutting these teeth occupied five weeks. The edge of the cutter, whilst cutting the metal, was well washed with turpentine. Care had to be taken to keep the temperature constant and uniform throughout the specially-constructed room."

Certificate of Test

P.T.R. II 591

For a graduated dial of 55 c/m (about 22in.) diameter, of bronze, with inlaid silver strip on which are two progressive divisions at intervals of five minutes. The dial has been sent in by the firm E. R. Watts & Son in London, and is marked with the above test mark near the commencing line 0°.

In the table on the other side are indicated the quantities by which the divisional lines subjected to the test deviate from those places which they would occupy if the division was absolutely correct (without errors). Deviations in the sense of progressive figures are marked with the sign +, such in the opposite direction with the sign -.

The figures indicated refer to the centre line of the divisional lines of the outer one of the two divisions and this on places of the same in the neighbourhood of a circular line which divides in halves the lengths of the shortest divisional lines. They are arranged in such a manner that the sum of the deviations of the thirty divisional lines, the numbers of which are divisible by 12 without leaving a remainder, possesses the value of 0. These thirty lines form the basis for the fundamental examination and the remaining ones are inserted between them.

The figure values indicated are reliable for the thirty fundamental lines up to about ± 0.3 seconds, for the remaining lines in the average up to about ± 0.5 seconds.

CHARLOTTENBURG, 6th April, 1908.

PHYSICAL TECHNICAL IMPERIAL INSTITUTE,

DEPT. II.,

(Signed) HAGEN.



Test Certificates without the Official Seal are of no value.

The above is a translation of the original certificate issued by the German Government Institution at Charlottenburg. The original can be seen at our works, London, England.

Table of Errors

Deg.	0	+0.1	Error	30	+0.5	Error	60	-0.2	Error	90	-0.3	Error	120	0.0	Error	150	-0.6	Error	180	0.0	Error	210	+0.9	Error	240	+0.4	Error	270	-0.2	Error	300	-0.5	Error	330	-0.9	Error
Deg.	1	0.0	Deg.	31	+0.5	Deg.	61	-0.2	Deg.	91	-0.3	Deg.	121	+0.3	Deg.	151	-0.5	Deg.	181	-0.5	Deg.	211	+1.1	Deg.	241	+0.7	Deg.	271	-0.3	Deg.	301	-0.3	Deg.	331	0.0	Deg.
Deg.	2	0.0	Deg.	32	+0.1	Deg.	62	-0.1	Deg.	92	+0.2	Deg.	122	+0.4	Deg.	152	+0.1	Deg.	182	-0.6	Deg.	212	+0.9	Deg.	242	+0.9	Deg.	272	+0.1	Deg.	302	-0.7	Deg.	332	-0.5	Deg.
Deg.	3	+0.3	Deg.	33	+0.3	Deg.	63	-0.4	Deg.	93	+1.0	Deg.	123	+0.3	Deg.	153	-0.1	Deg.	183	-0.7	Deg.	213	+1.2	Deg.	243	+1.3	Deg.	273	-0.2	Deg.	303	-0.8	Deg.	333	-0.8	Deg.
Deg.	4	+0.1	Deg.	34	+1.3	Deg.	64	-0.4	Deg.	94	+0.9	Deg.	124	+0.3	Deg.	154	-0.1	Deg.	184	-0.8	Deg.	214	+1.3	Deg.	244	+1.7	Deg.	274	+0.2	Deg.	304	-1.0	Deg.	334	0.0	Deg.
Deg.	5	+0.5	Deg.	35	+1.4	Deg.	65	-0.2	Deg.	95	+0.8	Deg.	125	0.0	Deg.	155	-0.8	Deg.	185	-0.4	Deg.	215	+1.5	Deg.	245	+1.0	Deg.	275	+0.4	Deg.	305	-0.6	Deg.	335	-0.3	Deg.
Deg.	6	+0.3	Deg.	36	+1.3	Deg.	66	+0.3	Deg.	96	+0.6	Deg.	126	+0.1	Deg.	156	-0.3	Deg.	186	-0.6	Deg.	216	+0.6	Deg.	246	+1.5	Deg.	276	+0.4	Deg.	306	-0.5	Deg.	336	-0.4	Deg.
Deg.	7	+0.1	Deg.	37	+1.8	Deg.	67	+0.5	Deg.	97	+0.1	Deg.	127	+0.1	Deg.	157	-0.4	Deg.	187	-0.6	Deg.	217	+0.5	Deg.	247	+0.8	Deg.	277	-0.3	Deg.	307	-1.0	Deg.	337	+0.3	Deg.
Deg.	8	+0.5	Deg.	38	+1.5	Deg.	68	-0.4	Deg.	98	+0.4	Deg.	128	+0.2	Deg.	158	-0.2	Deg.	188	+0.2	Deg.	218	+0.5	Deg.	248	+0.8	Deg.	278	+0.5	Deg.	308	-1.1	Deg.	338	+0.5	Deg.
Deg.	9	+0.4	Deg.	39	+1.3	Deg.	69	-0.5	Deg.	99	+0.6	Deg.	129	+0.5	Deg.	159	-0.1	Deg.	189	0.0	Deg.	219	+0.8	Deg.	249	+1.1	Deg.	279	+0.3	Deg.	309	-1.0	Deg.	339	+0.7	Deg.
Deg.	10	-0.6	Deg.	40	+0.9	Deg.	70	-0.1	Deg.	100	+0.2	Deg.	130	+0.5	Deg.	160	-0.2	Deg.	190	-0.5	Deg.	220	+1.1	Deg.	250	+1.5	Deg.	280	0.0	Deg.	310	-0.2	Deg.	340	-0.1	Deg.
Deg.	11	+0.3	Deg.	41	+0.4	Deg.	71	-0.3	Deg.	101	0.0	Deg.	131	-0.1	Deg.	161	+0.1	Deg.	191	-0.1	Deg.	221	+0.2	Deg.	251	+1.5	Deg.	281	+0.2	Deg.	311	-0.8	Deg.	341	+0.1	Deg.
Deg.	12	+0.1	Deg.	42	+0.6	Deg.	72	-0.3	Deg.	102	0.0	Deg.	132	-0.1	Deg.	162	-0.1	Deg.	192	-0.1	Deg.	222	+0.7	Deg.	252	+1.1	Deg.	282	-0.5	Deg.	312	-0.2	Deg.	342	+0.2	Deg.
Deg.	13	0.0	Deg.	43	+0.5	Deg.	73	+0.2	Deg.	103	+0.2	Deg.	133	-0.1	Deg.	163	-0.4	Deg.	193	-0.9	Deg.	223	+1.0	Deg.	253	+0.4	Deg.	283	-0.3	Deg.	313	-0.2	Deg.	343	-0.5	Deg.
Deg.	14	-0.2	Deg.	44	+0.6	Deg.	74	+0.5	Deg.	104	+0.1	Deg.	134	-0.5	Deg.	164	-0.7	Deg.	194	-0.6	Deg.	224	+0.5	Deg.	254	+0.5	Deg.	284	-0.8	Deg.	314	-0.3	Deg.	344	+0.1	Deg.
Deg.	15	-0.5	Deg.	45	+0.5	Deg.	75	+0.4	Deg.	105	-0.1	Deg.	135	-1.0	Deg.	165	-1.3	Deg.	195	-0.7	Deg.	225	+0.7	Deg.	255	+0.8	Deg.	285	-0.8	Deg.	315	-0.6	Deg.	345	-0.9	Deg.
Deg.	16	-0.3	Deg.	46	+0.6	Deg.	76	+0.3	Deg.	106	-0.1	Deg.	136	-0.9	Deg.	166	-1.2	Deg.	196	-0.6	Deg.	226	+0.2	Deg.	256	+0.4	Deg.	286	-0.2	Deg.	316	-0.4	Deg.	346	-0.7	Deg.
Deg.	17	0.0	Deg.	47	+0.1	Deg.	77	+0.6	Deg.	107	+0.2	Deg.	137	-0.5	Deg.	167	-1.1	Deg.	197	-0.2	Deg.	227	+0.2	Deg.	257	+1.0	Deg.	287	0.0	Deg.	317	-0.7	Deg.	347	-0.4	Deg.
Deg.	18	-0.2	Deg.	48	+0.7	Deg.	78	+0.6	Deg.	108	0.0	Deg.	138	-0.9	Deg.	168	-1.6	Deg.	198	0.0	Deg.	228	+0.5	Deg.	258	-0.1	Deg.	288	+0.2	Deg.	318	-1.0	Deg.	348	-0.8	Deg.
Deg.	19	-0.1	Deg.	49	+0.2	Deg.	79	+0.9	Deg.	109	+0.4	Deg.	139	-0.9	Deg.	169	-1.6	Deg.	199	-0.2	Deg.	229	+0.6	Deg.	259	-0.4	Deg.	289	-0.3	Deg.	319	-0.5	Deg.	349	-0.8	Deg.
Deg.	20	-0.2	Deg.	50	0.0	Deg.	80	+0.5	Deg.	110	+0.7	Deg.	140	-0.6	Deg.	170	-1.0	Deg.	200	+0.1	Deg.	230	+0.3	Deg.	260	-1.0	Deg.	290	-0.5	Deg.	320	-0.5	Deg.	350	-0.7	Deg.
Deg.	21	+0.2	Deg.	51	-0.5	Deg.	81	+0.3	Deg.	111	+0.4	Deg.	141	-0.7	Deg.	171	-1.6	Deg.	201	-0.2	Deg.	231	+0.6	Deg.	261	-1.5	Deg.	291	-0.6	Deg.	321	-0.5	Deg.	351	-0.7	Deg.
Deg.	22	-0.1	Deg.	52	-0.4	Deg.	82	+0.3	Deg.	112	0.0	Deg.	142	-1.0	Deg.	172	-0.7	Deg.	202	-0.2	Deg.	232	+0.1	Deg.	262	-1.0	Deg.	292	-0.7	Deg.	322	-1.0	Deg.	352	+0.2	Deg.
Deg.	23	+0.1	Deg.	53	-0.8	Deg.	83	+0.3	Deg.	113	-0.2	Deg.	143	-0.5	Deg.	173	-1.0	Deg.	203	-0.1	Deg.	233	0.0	Deg.	263	-1.7	Deg.	293	-0.2	Deg.	323	-1.2	Deg.	353	+0.2	Deg.
Deg.	24	+0.1	Deg.	54	-0.5	Deg.	84	-0.2	Deg.	114	+0.2	Deg.	144	-0.4	Deg.	174	-1.1	Deg.	204	+0.6	Deg.	234	0.0	Deg.	264	-0.8	Deg.	294	-0.2	Deg.	324	-0.8	Deg.	354	+0.6	Deg.
Deg.	25	0.0	Deg.	55	-0.1	Deg.	85	-0.1	Deg.	115	-0.2	Deg.	145	-0.3	Deg.	175	-1.3	Deg.	205	+0.7	Deg.	235	-0.2	Deg.	265	-0.4	Deg.	295	+0.1	Deg.	325	-1.0	Deg.	355	+0.2	Deg.
Deg.	26	+0.1	Deg.	56	-0.3	Deg.	86	-0.1	Deg.	116	0.0	Deg.	146	-0.3	Deg.	176	-1.0	Deg.	206	+0.3	Deg.	236	-0.1	Deg.	266	-0.2	Deg.	296	-0.4	Deg.	326	-0.6	Deg.	356	-0.2	Deg.
Deg.	27	+0.5	Deg.	57	-0.6	Deg.	87	-0.3	Deg.	117	-0.2	Deg.	147	+0.2	Deg.	177	0.0	Deg.	207	+1.3	Deg.	237	-0.2	Deg.	267	-0.7	Deg.	297	-0.4	Deg.	327	-0.7	Deg.	357	+0.3	Deg.
Deg.	28	+0.7	Deg.	58	-0.5	Deg.	88	+0.4	Deg.	118	+0.2	Deg.	148	-0.4	Deg.	178	0.0	Deg.	208	+0.6	Deg.	238	+0.3	Deg.	268	-0.5	Deg.	298	-0.9	Deg.	328	-0.8	Deg.	358	+0.2	Deg.
Deg.	29	+0.7	Deg.	59	+0.4	Deg.	89	0.0	Deg.	119	+0.1	Deg.	149	-0.3	Deg.	179	+0.3	Deg.	209	+1.0	Deg.	239	+1.0	Deg.	269	-0.1	Deg.	299	-1.0	Deg.	329	-0.7	Deg.	359	+0.4	Deg.
Deg.	30	+0.5	Deg.	60	-0.2	Deg.	90	-0.3	Deg.	120	0.0	Deg.	150	-0.6	Deg.	180	0.0	Deg.	210	+0.9	Deg.	240	+0.4	Deg.	270	-0.2	Deg.	300	-0.5	Deg.	330	-0.9	Deg.	360	+0.1	Deg.

Testing and Adjusting Room



North End



South End

Hints on the Choice of an Instrument

Probably there are no Scientific Instruments made that have so many various designs as Transit Theodolites, and we may mention that we have for the last fifty years been making these instruments, and have made almost every known design and variation, but it is impossible in this brief catalogue to more than specify the instruments we find in more general demand. The country in which an instrument is to be used should be carefully borne in mind when choosing an instrument, as one designed to meet the requirements of a country like India would be unsuitable for Canada. We have had a wide experience in these matters, and shall be pleased to advise those desiring assistance.

We believe there is great diversity of opinion amongst Surveyors as to the respective advantages of three-screw or four-screw Levelling Adjustment for Theodolites and Levels. The principal advantage claimed for the four-screw adjustment is the rapidity with which the instrument is levelled. We think this advantage is somewhat exaggerated, as although to a beginner the four-screw is considerably quicker and more easily understood, when once a man is accustomed to the three-screw adjustment, the instrument can be as quickly levelled with the latter as with the former. The great disadvantage of the four-screw adjustment is the risk of straining the axes of the instrument if the screws are forced; but with the three-screw, this is impossible, as there is no counter resistance to the screws.

We should advise a surveyor to have the pattern he is most accustomed to, as, if carefully used and not strained in any way, equally accurate results can be obtained with either method of adjustment.

The Transit Theodolite is now almost universally used for modern surveying, and with recent improvements, is an exceedingly accurate and convenient instrument.

Transit Theodolites can, roughly speaking, be divided into two classes, distinguished by their design as English, or United States Pattern.

The English Pattern has bevelled scales and verniers to the horizontal circle, the upper or telescope part of the instrument is detachable from the standards, and is packed separately in the case.

The United States Pattern Transit has flat scales to the horizontal circle enclosed in a practically air-tight case with glass openings for the verniers. The upper or telescope part is not detachable, and is packed in one piece with the instrument.

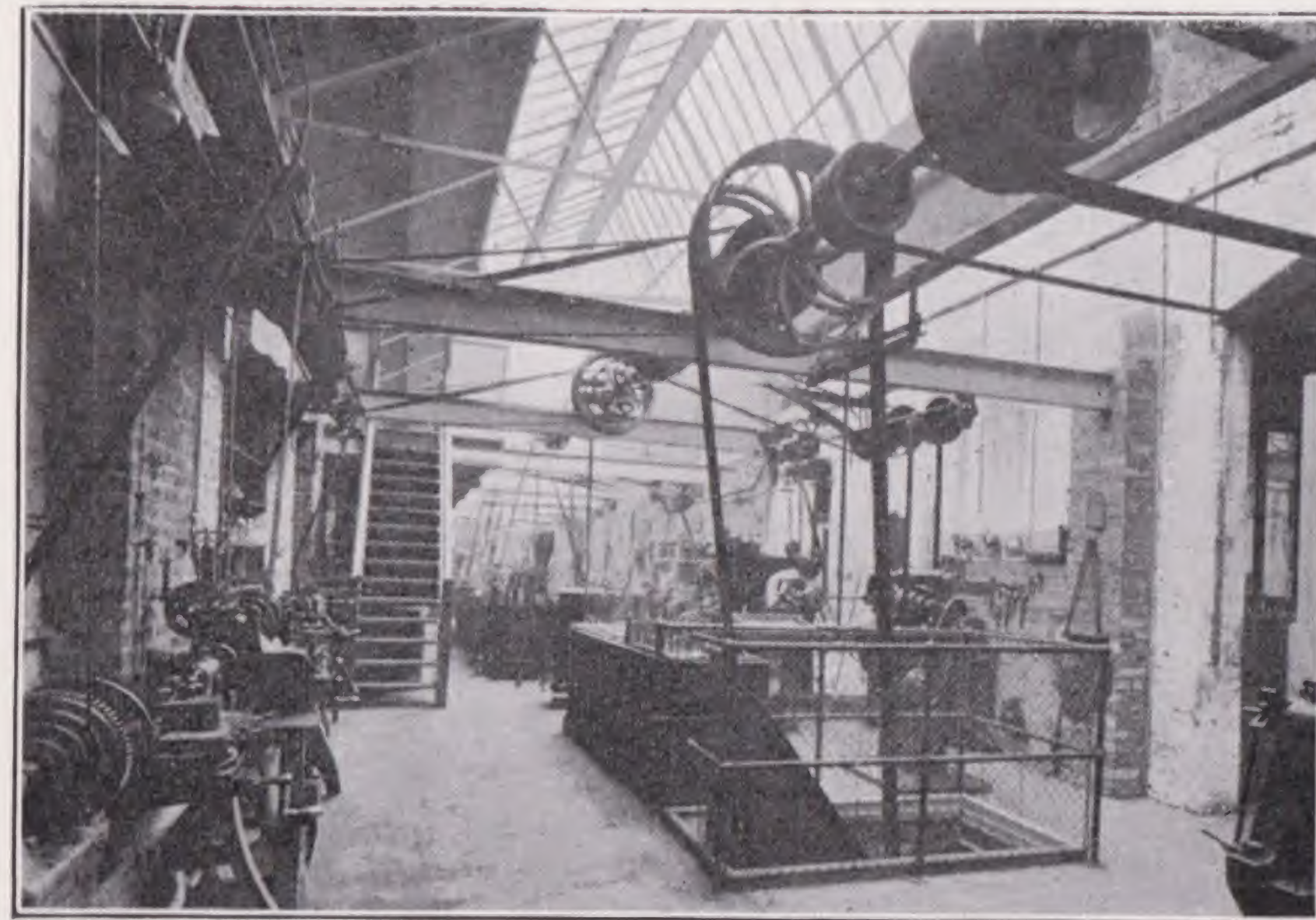
The individual surveyor will probably have his own idea as to which of these patterns is the better. Each pattern has its own advantages and disadvantages, which would appeal with more or less force to the surveyor, according to the kind of work he has to do, or perhaps to the nature of the country in which he is working, or even to the pattern of instrument he has been in the habit of using.

In selecting the kind of diaphragm or an instrument the following remarks may be useful:—

Web Diaphragms give the cleanest and best lines. They are, of course, very delicate, and must not on any account be touched, but if dust settles on the webs, it can usually be removed by blowing gently on to the diaphragm. In some climates damp affects the webs, and they become sagged or rotten, but, as a rule, webs in ordinary climates will last with care for years.



A part of the Lens-making Department



A corner of Machine Shop

Hints on the Choice of an Instrument—(Continued)

Glass Diaphragms are very accurate, especially for stadia work, as the width of the spaces is permanent. They are quite safely cleaned by gently rubbing with tissue paper, or, if only dusty, can be cleaned with a soft camel-hair brush. The greatest defect with glass diaphragms is that with changes of temperature moisture is likely to collect on the glass, and so render the telescope useless till it is removed or evaporated.

Point Diaphragms are very good, but if once the points are damaged they are useless. For Levels they are not so suitable, as it is necessary to bring the extreme point of the diaphragm exactly on to the edge of the Levelling Staff before accurate readings can be taken, and this necessitates always having a clamp and slow motion screw attached to the instrument.

Unless otherwise ordered we always put webbed diaphragms in our instruments, and a spare glass diaphragm (except in the cheaper instruments) is packed separately in the case, so that, in the event of an accident to the webbed diaphragm, a surveyor can use the glass one till it is convenient to replace the webs.

It is impossible in this catalogue to specify more than our Standard Patterns; we are, however, always pleased to make instruments to any design or pattern, and, if a sufficiently large number are ordered at a time, the cost of the instruments need not be more, in proportion, than our standard instruments as listed in this catalogue. It should be borne in mind, however, that unless a number of a specially desired model are required, it is more economical to select an instrument of a Standard Pattern, as one made to some special design has to go through our works by itself, and this is expensive and likely to cause delay in delivery.

We have, in the design of our instruments, studied very carefully weight and portability, and in most of our Standard Patterns the weight of the instrument is given in this list. This point would not appeal so much to surveyors in a country like India, where labour is cheap, and a surveyor rarely carries his instrument, but in some countries, such as America, where a surveyor usually has to carry his own instrument for long distances, it is a very important point indeed.

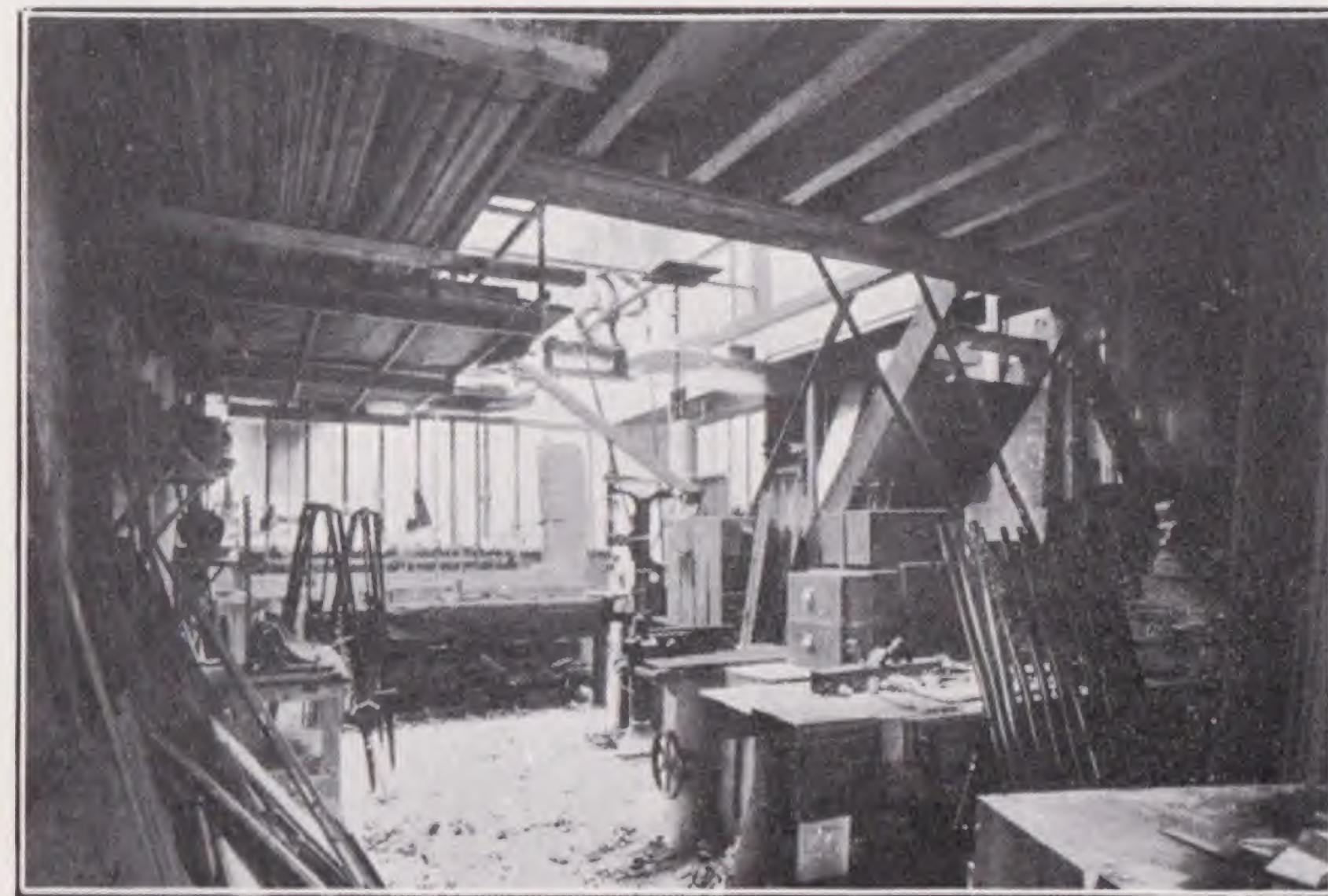
Some of the designs of our instruments are quite new, and we would specially draw attention to our "C.E." Levels (Y and Dumpy) on pages 36-39. These instruments can have either three-screw or four-screw adjustment, whichever is preferred. They have a number of various improvements, such as screw-focussing eyepieces, foot screws entirely protected from dust, rain guards, &c., are exceedingly rigid and strong, and will stand a great deal of hard wear. The weight is only 8lbs.

Our Standard Pattern Transit Theodolites (page 20) can be constructed (except the 3in. size) with the horizontal verniers placed about 30° from the line of sight. This enables a surveyor to read the front horizontal vernier without changing his position whilst looking through the telescope, but it has the disadvantage that, in hot countries where probably a helmet is being worn, the telescope, if observing altitudes, is somewhat in the way when the vernier is being read. The conditions, therefore, under which a surveyor is likely to be using his instrument must decide which pattern he prefers. Unless otherwise ordered the verniers will be placed between the standards in the usual way, as illustrated on page 20.

Theodolites can be graduated centesimally to read $^{\circ}$ or of a grade instead of, as usually, to 360° . If a number of Theodolites are ordered at a time with this dividing there will be no extra charge, but if only one is ordered it will cost an additional 10/-.



Moulding Shop of Foundry



Ground floor of Cabinet Shop

A few Suggestions as to the Care and Protection of Instruments when in use

Great care should be taken after using an instrument that all dust and moisture should be wiped off with a soft, clean rag or handkerchief. Before placing the instrument in the box note carefully that it is in the correct position, so that the lid will shut without strain. A good plan is to mark the box in such a way as to distinguish clearly in what position the various parts of the instrument are correctly placed, *e.g.*, the eye and object ends of telescope; tangent or slow-motion screws, etc. Before closing the box see that all clamps are tight.

If the instrument is likely to be jolted in transport it is better to lightly wedge some soft rag or wood-wool round the principal parts to prevent jarring.

Before using the instrument see that all tangent or slow-motion screws are in the centre of their run, and never force these screws beyond their limit.

Never strain the clamp screws or foot-screws. These should be clamped up tight but not strained.

When levelling with the four-screw adjustment always use an opposite pair of screws together, that is, tighten up one screw with one hand, whilst its opposite screw is loosened with the other hand. By this means the danger of straining the axes is avoided.

It is of no use having an accurate and reliable instrument if the stand on which it is fixed is not rigid; it is as well therefore to examine the head of tripod occasionally to see that it is not loose, as it is quite easy to tighten up the bolts of the head. The shoes also may have worked loose; though this latter very rarely happens.

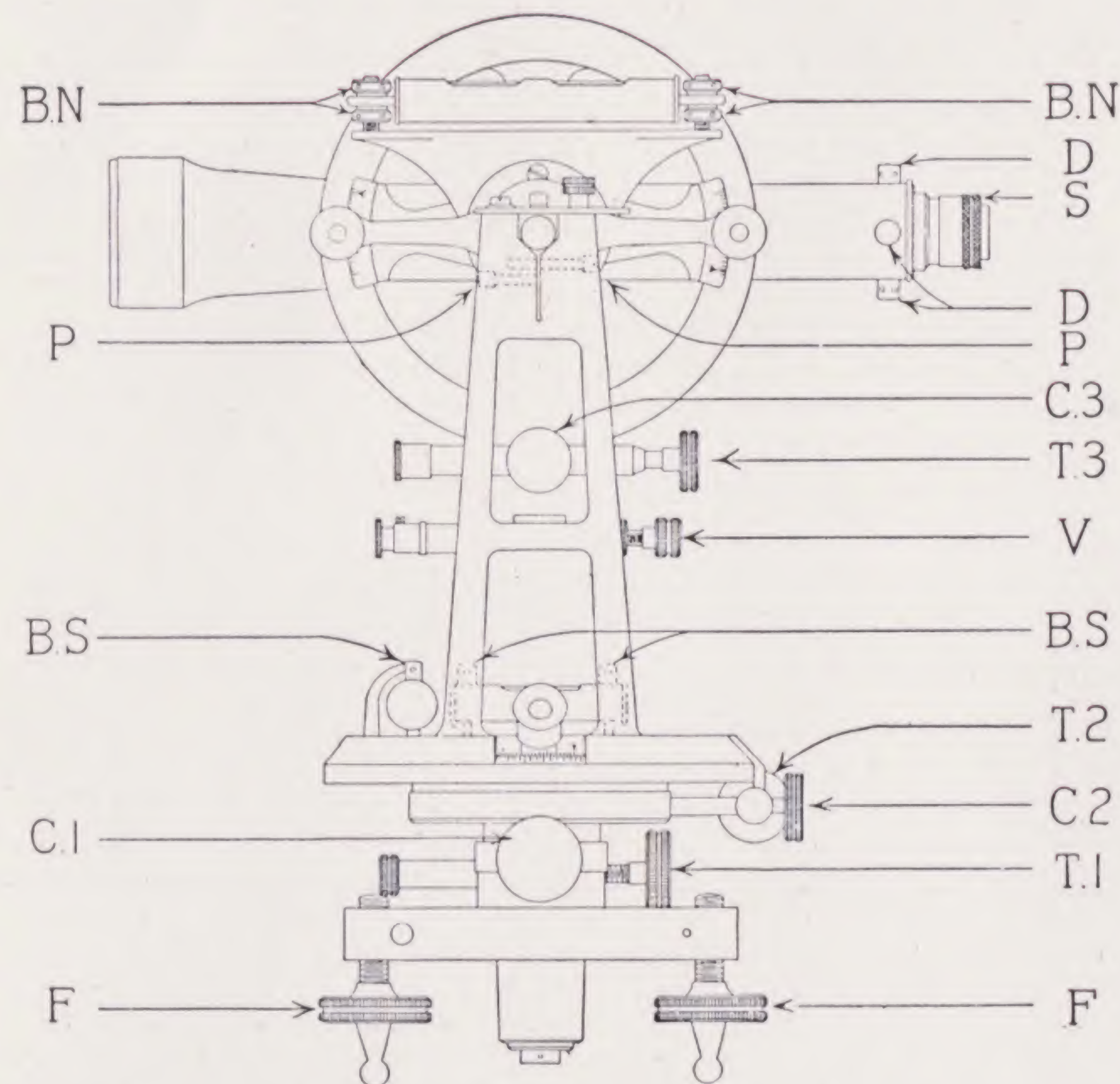
Be careful when carrying the instrument over the shoulder by the stand to see that the clamps are tight, as if the axes are left loosely swinging, damage to the centres may result. It is, of course, scarcely necessary in this connection to warn Surveyors to see that the instrument is securely fixed on the stand. We are constantly having instruments sent to us for repairs because of neglecting this simple safeguard.

Unless the compass of an instrument is in actual use, always keep the needle off its pivot by means of the lifter milled head, and also see that this milled head is screwed right home, so that there is no chance of the lifter working loose, because if the needle swings idly on its pivot, the point soon becomes dull, and the needle loses its sensitiveness.

The graduations on the circles should never be rubbed more than is absolutely necessary. If any grit has settled on the graduations, use a small camel-hair brush to dust the circles; a soft rag, moistened with sweet oil, can be applied carefully to remove tarnish. It is of the utmost importance to keep the divisions sharp, and if they are rubbed very much, the silver, being soft, soon wears.

If the capstan pin is used at any time to correct adjustments, always be careful not to strain the screws or nuts. These should be set tight and no more.

How to adjust a Transit Theodolite



1). The adjustment of the Plate Levels—

Fix the instrument firmly on its tripod, and see that it is quite rigid. Turn the instrument so that the two plate levels are each parallel with two opposite foot-screws, and bring the air bubble of each level into the centre of its run by means of the foot-screws FF.

Turn the instrument half way round, that is 180° , and if the two air bubbles are still in the middle the levels are in adjustment; but if they are not, correct half the error by the capstan head adjusting screws BS, and half by the foot-screws FF. If on again turning the instrument round half way the bubbles are not quite exact, the same operation must be repeated.

(2). To adjust the Standards so that the Telescope will transit on a perfectly "plumb" line—

Carefully focus the screw eyepiece S, so that the webs appear clearly visible, and remain stationary when the eye is slightly moved from the centre of the eyepiece. Direct the telescope to a point on a clearly defined object at a considerable elevation, and, by means of either tangent screw T_1 or T_2 (both clamps C_1 and C_2 being tightened), bring the intersection of the diaphragm wires exactly to bear on that point; then direct the telescope (without having moved tangent T_1 , T_2) to another object as far below the first point as possible, and note exactly the spot at the intersection of the cross lines. Turn the instrument 180° , transit the telescope, and re-direct it to the higher point, and if on depressing the telescope, the cross wires again intersect the lower point, the transit axis is horizontal; but if the lower point is not intersected by the cross wires, correct half the apparent error by the screws P, then direct the telescope again to the higher point, and note the new position when depressing the telescope. If there is still an error when the instrument is again turned 180° , the above operation must be repeated.

(3). To adjust the line of collimation of the Telescope—

The instrument being levelled, clamps C_1 and C_2 being tightened, and the horizontal verniers reading, say, 360° and 180° , then by means of tangent screw T_1 direct the telescope on any well defined object, as far distant as possible, and especially note the point intersected by the vertical diaphragm wire. Then unclamp C_2 and turn the instrument exactly 180° . Transit the telescope, and if the vertical wire of the diaphragm still cuts exactly the same point, the telescope is in collimation; if, however, it does not, adjust half the error with the diaphragm screws DD, and the other half with the tangent T_1 . If, on again turning the instrument 180° and transitting the telescope, there is still a small error, repeat the operation till the adjustment is correct.

(4). To adjust the Level on the Index Arm.—

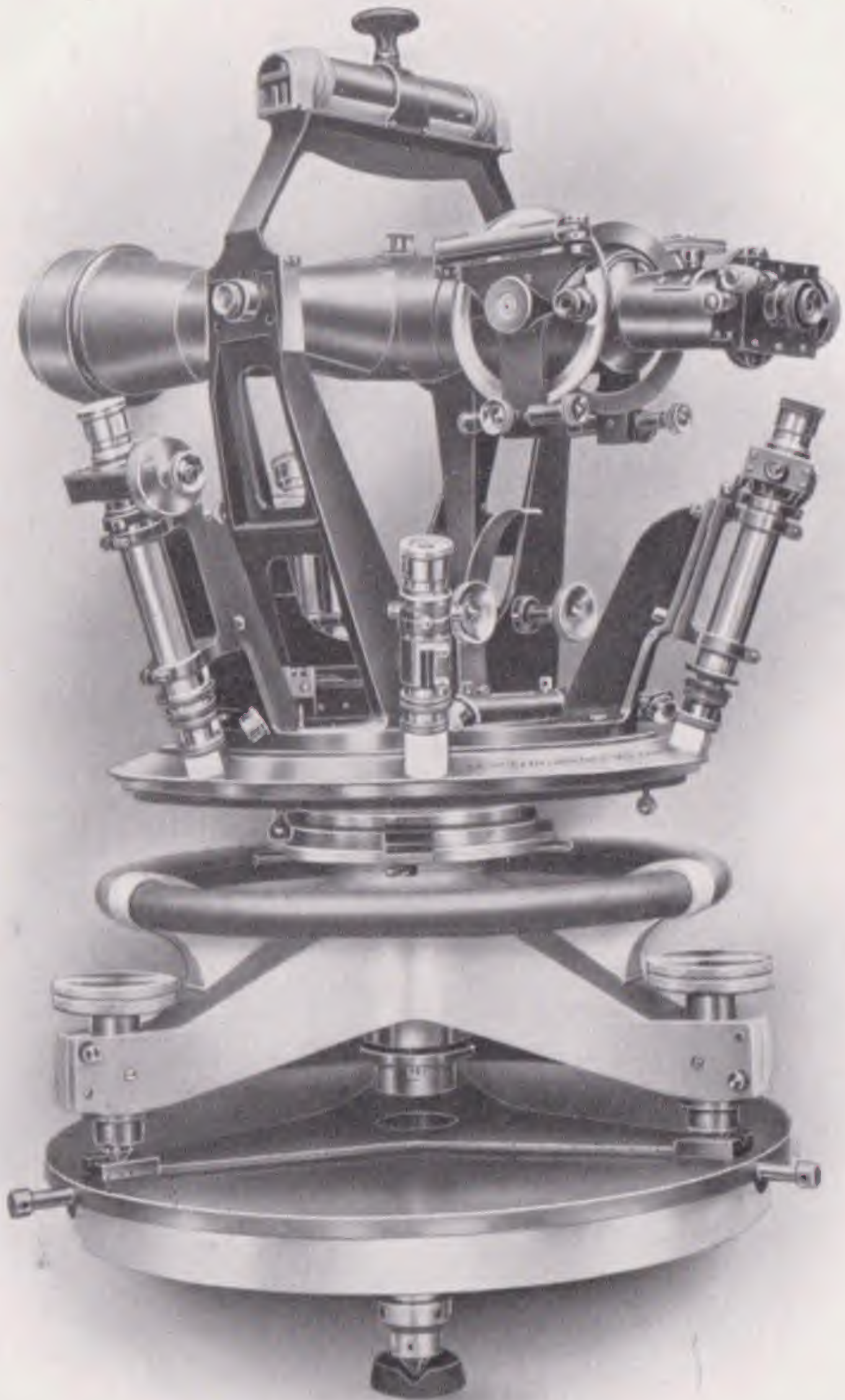
(In Instruments where the level is on the Telescope instead of, or in addition to, one on the Index Arm, the adjustment is the same).

The instrument being levelled by means of the horizontal plate levels, see that the Verniers read exactly at zero on the Vertical Circle; direct the telescope on to a levelling staff held as far away as can be distinctly seen, clamp the instrument (C_1 , C_2 , and C_3) and take the reading on the staff with the horizontal diaphragm line. Now release clamp C_3 , and transit telescope exactly 180° , being very particular that Verniers read zero on the Vertical Circle. Next release either clamp C_1 or C_2 , and turn the instrument so as to again take a reading from the levelling staff. If the reading is exactly the same as before, the adjustment is perfect, but if it is not, correct half the error by means of the milled screw and counter nut V, then take another reading on the staff, and repeat the previous operation till all error is eliminated. When the adjustment is complete, bring the air bubble of the level on the Index Arm to the centre of its run by means of the nuts BN.

When replacing diaphragm readjust as per Nos. 3 and 4

"	"	vernier arm level	"	No. 4
"	"	plate levels	"	No. 1

Geodetic Theodolites



Nos. 1 and 2

This instrument is designed for use in important Primary Triangulation and other work where readings of extreme accuracy are essential.

Specification

Horizontal Circle, read by three Micrometer Microscopes to 1". The graduations are figured at every degree, the figures being read by a Pointer Microscope. Repeating Circle. Steel Vertical Axis.

Levels. Exceedingly sensitive and accurate chambered Bubbles, graduated so that each tenth of an inch=1" of arc.

Telescope. Clear aperture of 3in., focal length 20in., fitted with two Finders reading to 1', and Micrometer Eyepiece. Hardened Steel Pivots.

Levelling Adjustment. Three-screw, specially designed for this instrument. Screw threads protected for entire length.

Dust-proof Bearings and fittings throughout. Circular leather-covered handle for lifting instrument.

Centering Base Plate.

Electric Illuminating Apparatus for night work, with six lamps, S. and R. coil for regulating the amount of light, 6-way switch, dry batteries, &c.

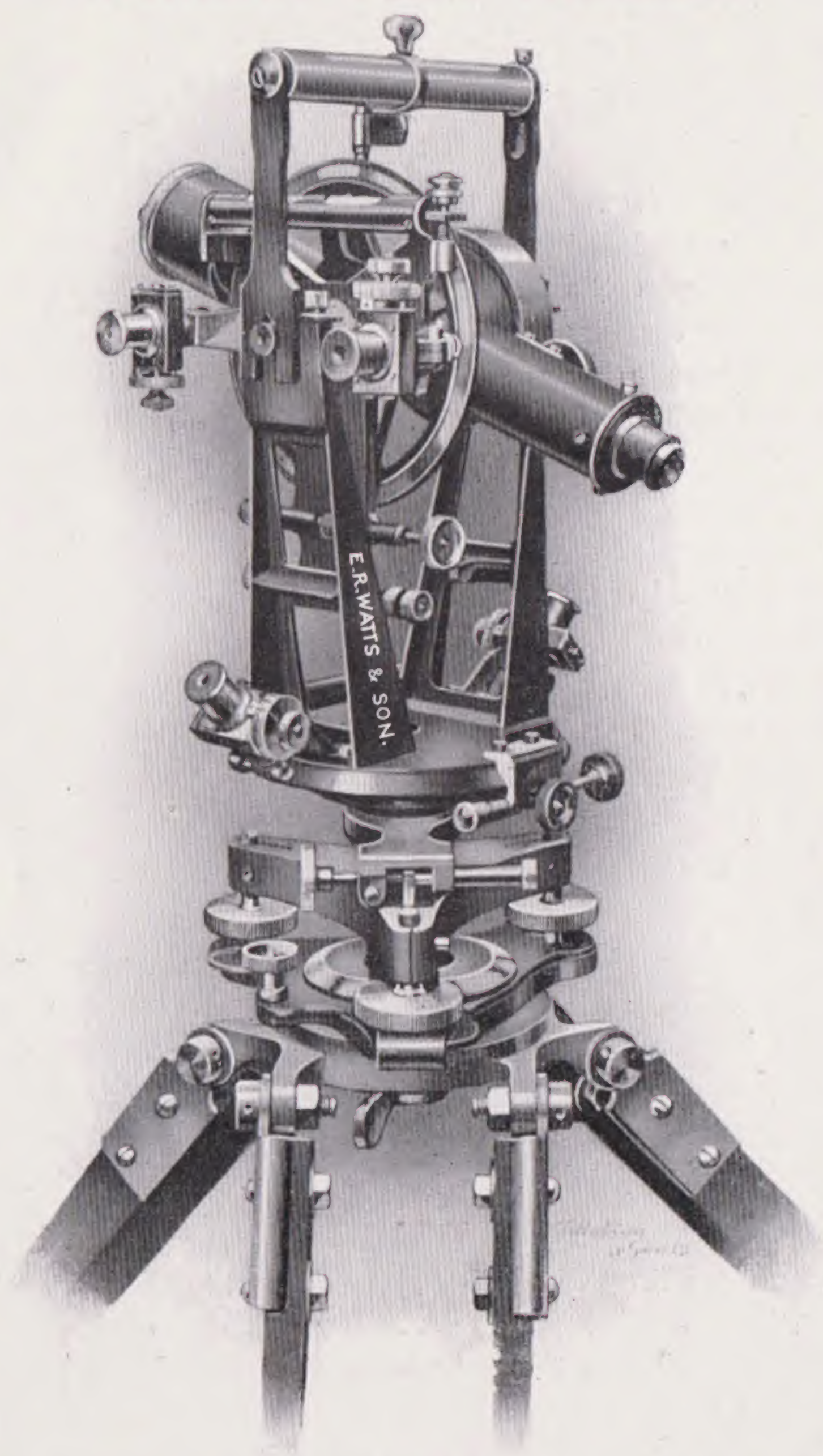
Cases. Instrument is packed in two strong teak cases for transport. The Base Plate and Illuminating Apparatus are packed in separate boxes.

Accessories. Striding or axis level, and mandril for correcting telescope axis bearings, spare eyepiece, sunshade, two sun-glasses of different density, screw driver, tommy pins, &c.

	PRICE			Code Word
	f	s.	d.	
No. 1—10in., reading to 1"	130	0	0	.. <i>Candid</i>
No. 2—12in. ,, ,, 1"	150	0	0	.. <i>Camber</i>
No. 3—Electric Illuminating Apparatus	10	0	0	.. <i>Electrical</i>

These Geodetic Instruments are usually designed to meet special requirements, and we shall be pleased to submit prices and drawings to any desired specification.

Micrometer Transit Theodolites



Nos. 6-10

The extreme accuracy required in some of the modern surveys necessitates an instrument of greater precision than the ordinary Transit Theodolite, the graduations of which are read by Verniers. In view of this, Micrometer Theodolites are becoming far more extensively used, and the old idea that such instruments are too delicate for field work is fast disappearing.

These Theodolites, as manufactured by us, will be found extremely portable, and with ordinary care the various adjustments will be found quite as permanent as those of the ordinary pattern Theodolite.

Specification

Graduations. The horizontal and vertical circles are figured at each degree, and are read by two opposite micrometers.

Telescope. In 5in. and 6in. instruments the object glass has a clear aperture of over 1½in., and a focal length of 10in. An inverting eyepiece, giving a magnification of about 25 diameters, and an erect diagonal eyepiece are supplied with each instrument. Diaphragm of any specified arrangement (webs, platinum-iridium points, or glass), if not specified, however, webs are supplied.

Trough Compass is only supplied when specially ordered. (For additional cost see below.)

Levelling Adjustment. Three-screw, of improved design.

Tripod of improved open-frame pattern, with centering head.

Cases. Instrument is packed in two dust-proof cases; leather coverings only when specified, at extra cost.

Accessories include axis level, spare diaphragm, oil bottle, plummet, dusting brush, spanners, screwdrivers, &c., &c.

Electric Illuminating Apparatus consisting of two lamps, S. & R. coil for regulating the amount of light, dry batteries, &c.; packed in a small and portable mahogany case.

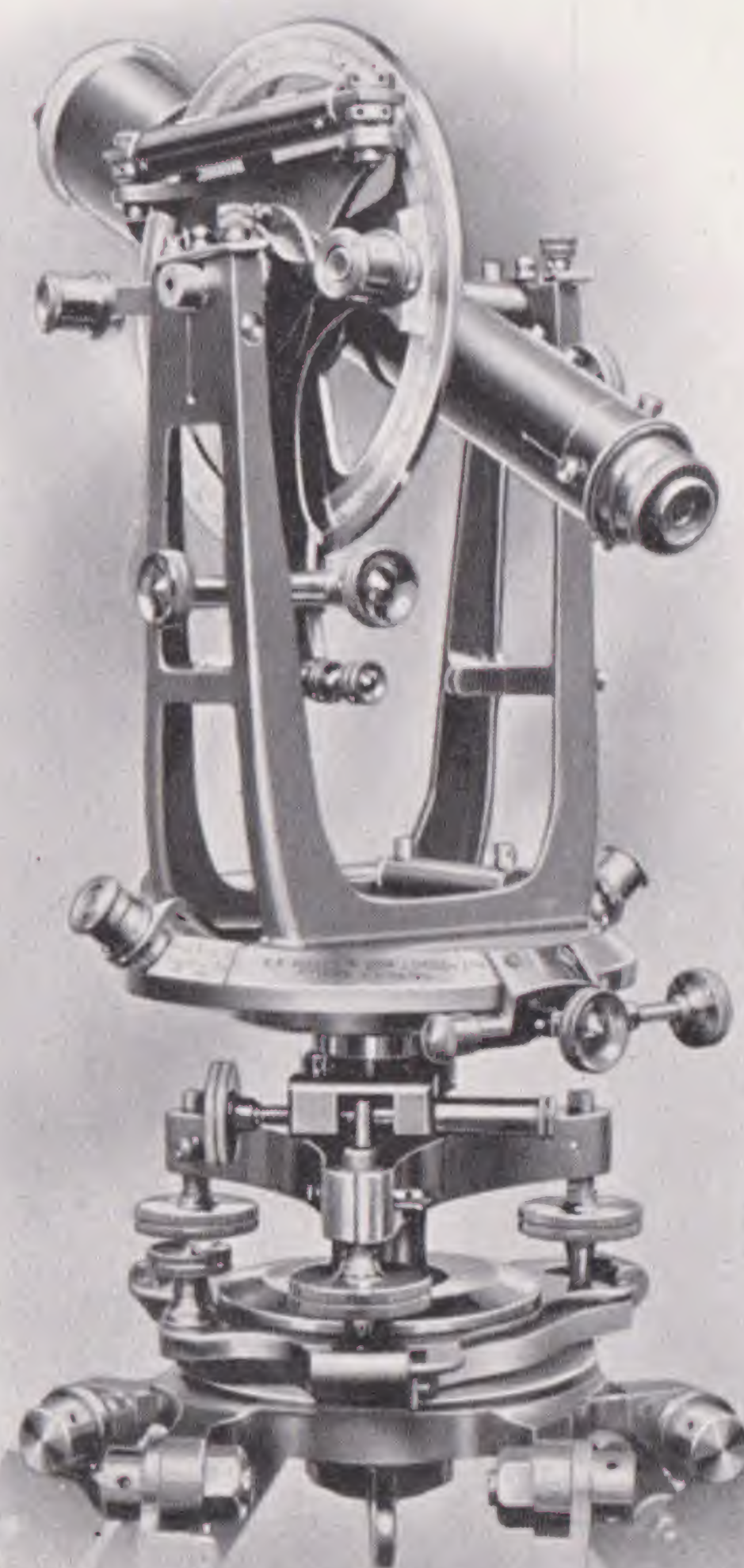
PRICE

		£	s.	d.	Code Word
No. 6.— 5in. reading to 10"	.. ..	42	0	0	.. Can
No. 7.— 6in. reading to 10"	.. ..	45	0	0	.. Canst
No. 8.— 6in. reading to 5"	.. ..	47	0	0	.. Cannon
No. 9.— 8in. reading to 5"	.. ..	68	0	0	.. Case
No. 10.— 8in. reading to 2"	.. ..	75	0	0	.. Camel
Trough Compass, extra	.. ..	1	10	0	.. Trough
Leather Cases, extra, per set from	.. ..	5	0	0	.. Leather
Electric Illuminating Apparatus	.. ..	5	10	0	.. Electric
Micrometer Eyepieces, according to the design required, from	.. ..	4	0	0	.. Micreya

If Nos. 6-10 are required with Verniers to the vertical circle reading to 10", instead of micrometers, the price will be £5 less.

Transit Theodolites (Standard Specification)

With Trough Compass

Weight of instrument, 4in. size .. 8 $\frac{3}{4}$ lbs.

Nos. 15-23

Specification

Telescope. Achromatic, with extra large aperture object glass, giving increased illumination and larger field of view, and also enabling an eyepiece of greater power to be used. Two inverting eyepieces are supplied, with powers (in 5in. and 6in. size instruments) of about 18 and 32 diameters; also a diagonal eyepiece. Telescope transits both eye end and object end.

Graduated on silver. Two verniers to each circle, microscope to each vernier. Dividing of horizontal circle protected. Folding microscopes to horizontal circle. The horizontal verniers can be placed at an angle of about 30° from the line of sight for greater convenience in observation if desired (see page 11).

Compass. Trough, with edge-bar needle. Attached to standards.

Levelling Adjustment. Three-screw and locking plate. Four-screw parallel plate adjustment can be supplied (to order) at the same price, both with centering motion.

Standards are constructed in tough gun metal after our improved design. The standards and the upper horizontal vernier plate are in one solid casting.

Tripod. Any of our standard pattern tripods (see pages 46-47) can be supplied with this instrument without making any difference in the price.

Case. The instrument is packed in an exceedingly portable case of new design, the outside dimensions being as follows:—

3in. size	14 $\frac{1}{2}$ in. × 5in. × 4 $\frac{3}{4}$ in.	5in. size	18in. × 8in. × 7 $\frac{1}{4}$ in.
4in. size	18in. × 7 $\frac{1}{2}$ in. × 6 $\frac{1}{2}$ in.	6in. size	18 $\frac{1}{2}$ in. × 9in. × 8in.
7in. and 8in. sizes are packed in two cases.			

Every care has been taken to make the instrument as complete as possible, and to this end a spare glass diaphragm, spare bubbles, sunglass, erect diagonal eyepiece, oil bottle, waterproof hood, and other accessories, are packed in each case, and attention is drawn to this when comparing our prices with those of other first-class makers.

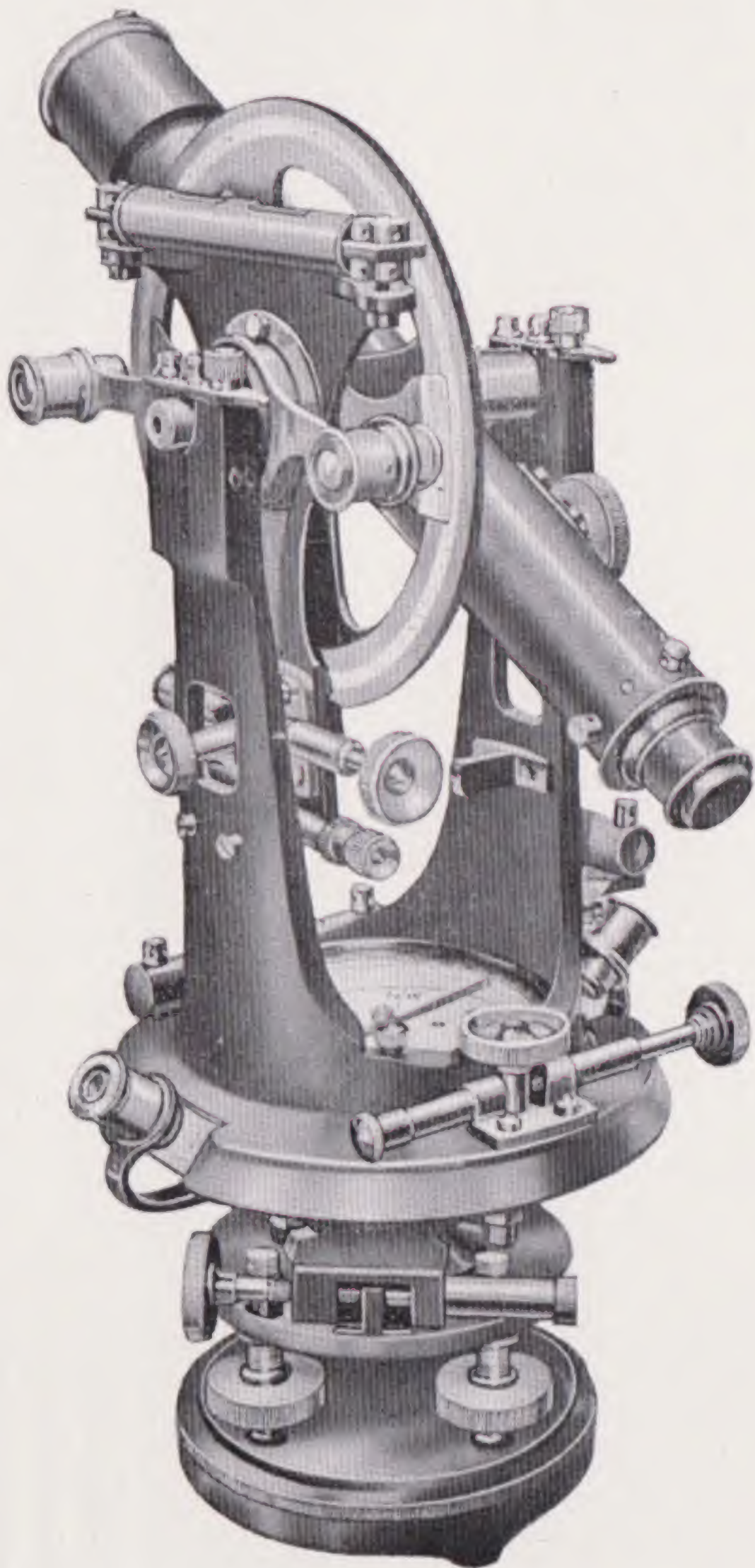
PRICE

					£	s.	d.	Code Word
No. 15—3in. reading to 1'	..	..	..	..	22	10	0	.. Iambic
No. 16—4in. reading to 1'	..	..	..	..	25	0	0	.. Ibex
No. 17—4in. reading to 20"	..	..	..	..	25	10	0	.. Ibeg
No. 18—5in. reading to 1'	..	..	..	..	27	10	0	.. Ibif
No. 19—5in. reading to 20"	..	..	..	..	28	0	0	.. Ibis
No. 20—6in. reading to 20"	..	..	..	..	30	0	0	.. Ibid
No. 21—6in. reading to 10"	..	..	..	..	32	10	0	.. Ibidem
No. 22—7in. reading to 10"	..	..	..	..	45	0	0	.. Icar
No. 23—8in. reading to 10"	..	..	..	..	50	0	0	.. Icarian

Leather Cases, 35/- to 55/-, according to size.

Transit Theodolites

(Round Compass Pattern)



Nos. 27-32

We have for many years made this pattern, as we find a large number of surveyors prefer a round compass Theodolite, and we are therefore continuing to manufacture it.

As this design costs less than our Standard Pattern Theodolites to manufacture, we are able to list it at a lower price, although we wish it to be understood that the quality and workmanship are quite equal to our more expensive instruments.

Specification

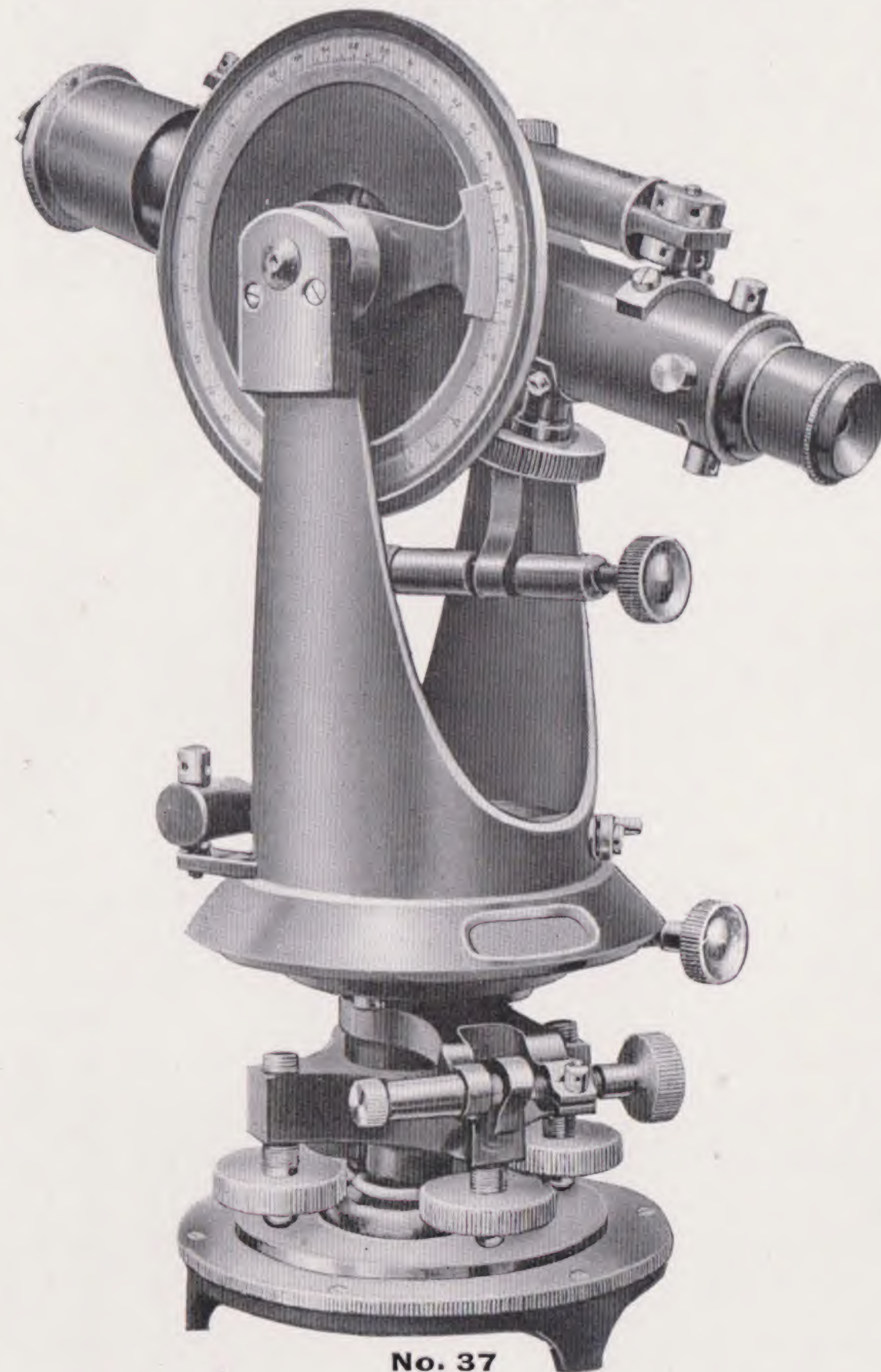
- Telescope.** Achromatic, with two inverting eyepieces.
- Graduated** on silver. Two verniers to each circle, microscope to each vernier. Dividing of horizontal circle protected.
- Levelling Adjustment.** Three-screw and locking plate or four-screw parallel plate, both with centering motion.
- Tripod.** Ordinary round stand or split leg.
- Case.** Polished mahogany, with lock and key, fitted with usual accessories.
- Weight.** The weight of instrument, 5in. size, is 15lbs. 7ozs.

				PRICE			Code Word
				£	s.	d.	
No. 27—4in.	Transit Theodolite,	reading to 1' ..		20	5	0	Idea
No. 28—4in.	„	„ „ 20"		20	10	0	Ideaz
No. 29—5in.	„	„ „ 1' ..		22	10	0	Ideal
No. 30—5in.	„	„ „ 20" or 30"		23	0	0	Ideally
No. 31—6in.	„	„ „ 20"		26	10	0	Idem
No. 32—6in.	„	„ „ 10"		29	0	0	Idemo

Leather Cases 35/- to 50/- according to size.

“Reconnaissance” Transit Theodolite

Exceedingly Light and Portable



No. 37

..24..

In response to a demand for a very light and portable Transit Theodolite at a moderate price we have specially designed this instrument.

In the production of this instrument neither strength nor durability has been sacrificed. It is made entirely throughout of our special hard alloy of gun metal, except for the main horizontal and vertical axes, which are of bell metal; **no aluminium whatever has been used.** We wish it to be distinctly understood that despite the fact of its lightness and low price, accuracy, workmanship, material, and finish are quite up to our usual high standard. The instrument has double axes, with long taper centres proportionate with size.

Specification

Graduations. Both circles are 3in. diameter and are graduated on solid silver to read by one single vernier to one minute. The horizontal vernier is placed at an angle of 30° to the line of sight.

Telescope. The telescope will transit at either end. The lenses are of the very best quality and give a power of 12 diameters. Sun-cap and sun-shade are provided.

Compass. Round, with edge-bar needle 2½in. long.

Levelling Adjustment. Four-screw or three-screw, both with centering motion.

Tripod. Specially designed for use with this transit. Either “Broomstick” or sliding pattern, constructed in ash.

Case. Mahogany case complete with accessories.

Weight. The weight of this instrument complete is **5 lbs.** Tripod, 6½ lbs.; case with accessories, 2 lbs. 10 ozs.

Outside Dimensions of Case. 14½in. × 5in. × 5in.

PRICE

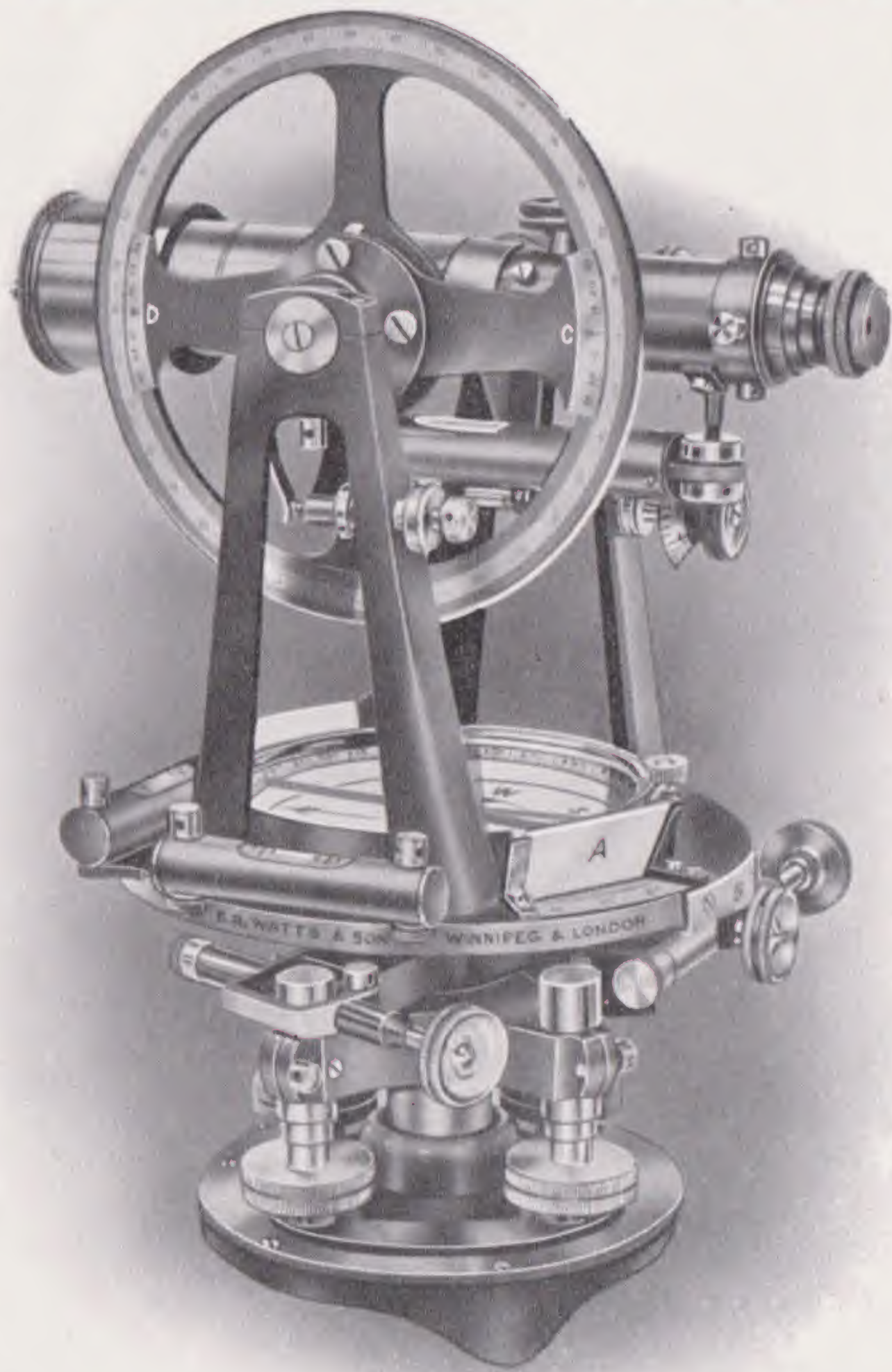
Code Word

No. 37—Instrument as above £16 10 0 .. *Igit*

Extra Leather case £1 10 0

..25..

The "C.E." Light Transit (American Pattern)



No. 40

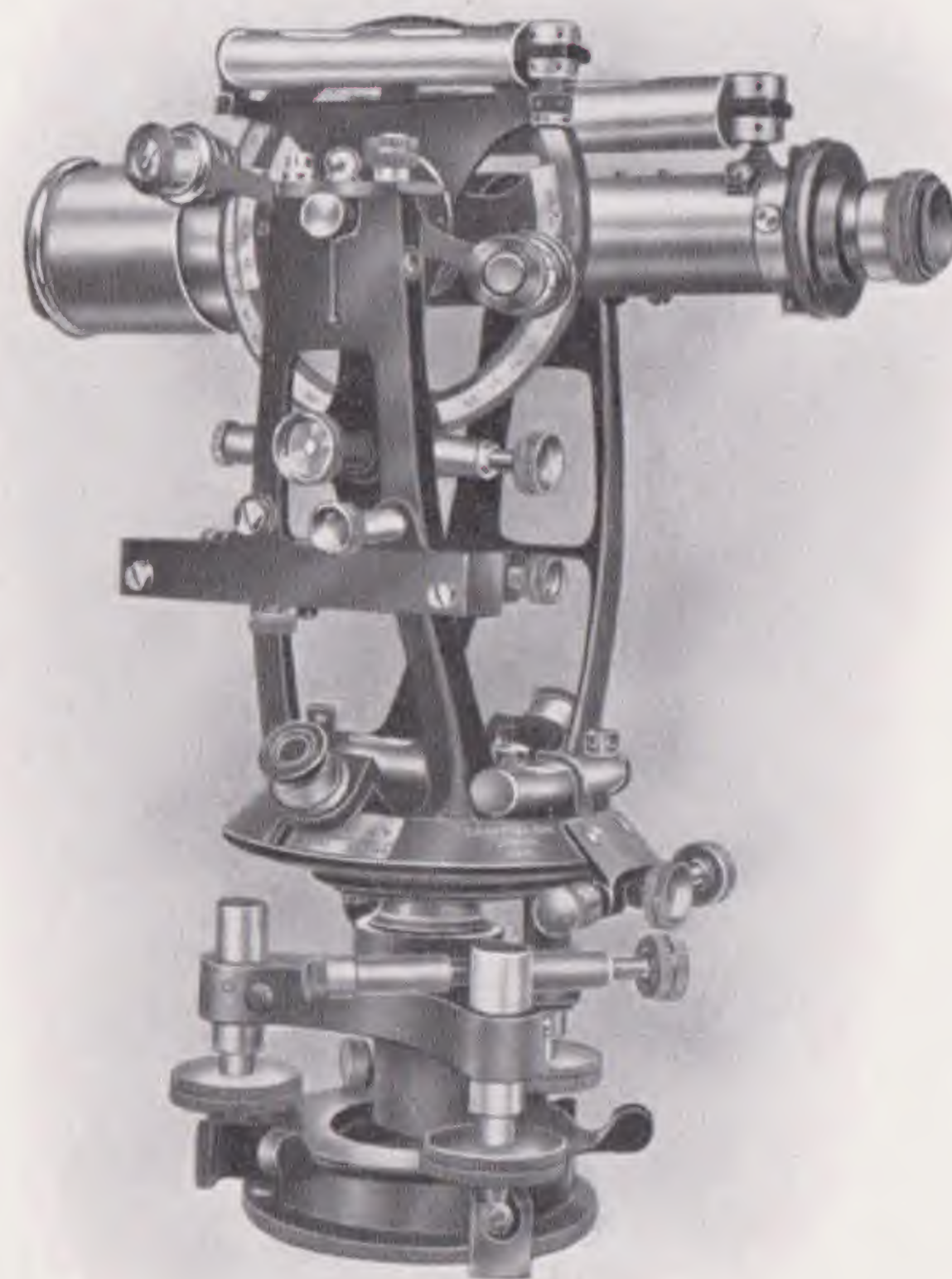
Lightness of weight in instruments being an important desideratum with Surveyors and Engineers, we have designed an "Engineer's" Transit of improved pattern, combining MINIMUM OF WEIGHT and maximum of strength, **the weight of instrument being 9 lbs.** The whole instrument is constructed in our special alloy of hard gunmetal, the upper horizontal plate and the two standards being combined in one casting. The instrument is packed in a leather-covered mahogany case of special design, which will be found most convenient and portable, the outside dimensions being **13½ in. × 7 in. × 7 in.**

Specification

- Graduations.** All on solid silver. Horizontal circle 4½ in. diameter, with two rows of figures; vertical circle 4½ in. diameter, with improved adjustment to verniers. Both circles have double and opposite verniers reading to 1'. Horizontal verniers covered with plate glass, dust and watertight, placed 30° to line of sight.
- Telescope** has a clear aperture of 1½ in., supplied with screw-focussing inverting eyepieces giving powers of 12 and 25 diameters; or, at an extra cost of £1, with erecting eyepiece; stadia diaphragm, sun-cap, sun-shade and dust guard to draw; telescope will "transit" either end.
- Gradienter** of improved design, with accurately machine-cut silver-bronze screw, one revolution of which = 1 in 100, reading directly to .01 by the drum. Two rows of figures giving rise and fall readings. Drum index scale can be raised clear of drum when not required.
- Slow-Motion Screws.** All accurately machine cut in silver bronze.
- Compass.** Round, with edge-bar needle 3¼ in. long, provided with magnetic variation scale giving 40° variation each way if desired, at an extra cost of £1.
- Levelling Adjustment.** Four-screw, with centering motion. Three-screw with centering base can be supplied to order at same cost. Screws provided with dust caps and means of taking up wear in the threads. Two levels are provided to horizontal plate.
- Tripod.** Any of our standard pattern Tripods (see pages 46-47) can be supplied with this instrument without making any difference in the price.
- Case.** Leather covered, with broad shoulder straps of improved design, of best well-seasoned mahogany, dovetailed. Outside dimensions, 13½ in. × 7 in. × 7 in.
- Accessories** include spare glass diaphragm, spare telescope and plate bubbles, oil bottle, waterproof cover for instrument, plummet, hand reader, &c., &c.
- Weight.** Instrument 9 lbs.
Case, including 8 oz. plummet and all accessories 7 lbs.

	PRICE	Code word
No. 40	£31 0 0	Ichel
Extras: Gradienter, £1; Variation Plate, £1		

Tacheometers



Nos. 41—44

This instrument has of late years come very largely into use abroad in place of the ordinary Theodolite. It is particularly useful in places where the usual method of chaining would be practically impossible owing to the nature of the country, as, these Tacheometers having **Anallatic Telescopes**, distances can be measured with ease and rapidity with the stadia webs without using a “constant,” thus saving considerable calculation.

One of the chief advantages of the Tacheometer being its usefulness in rough, uneven, or mountainous country, lightness and portability are important considerations. We have therefore lately entirely re-designed this instrument, paying special attention to these features.

The Telescopes of all sizes transit both ends.

We would specially draw your attention to the new model 3in. size Tacheometer. This is a very accurate and portable instrument, the **weight being only 5½lbs.** and the case measuring 14½in. × 5in. × 4¾in.

Specification

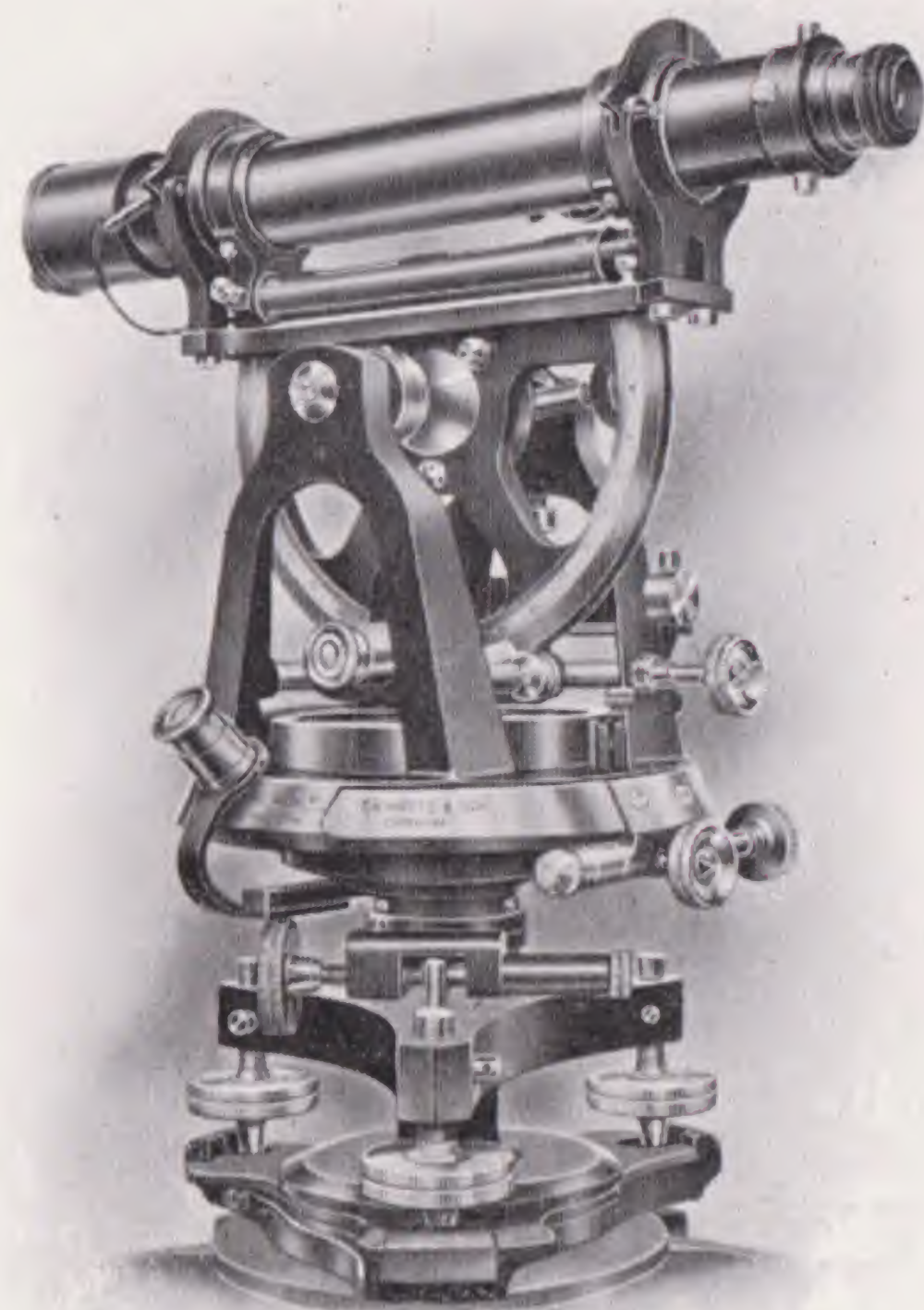
Specification is the same in all respects as our Standard Theodolites (page 21), except the Telescope, which is Anallatic, and has a stadia diaphragm giving values of 1-50, 1-100, and 1-200. It also has a vertical motion to the eyepiece, in order to eliminate parallax when using the outer wires of the diaphragm.

Graduations can be either on the centesimal system to 400 grades, reading by vernier to .01 of a grade, or as usual to 360°, reading by vernier to 1', 20", or 30".

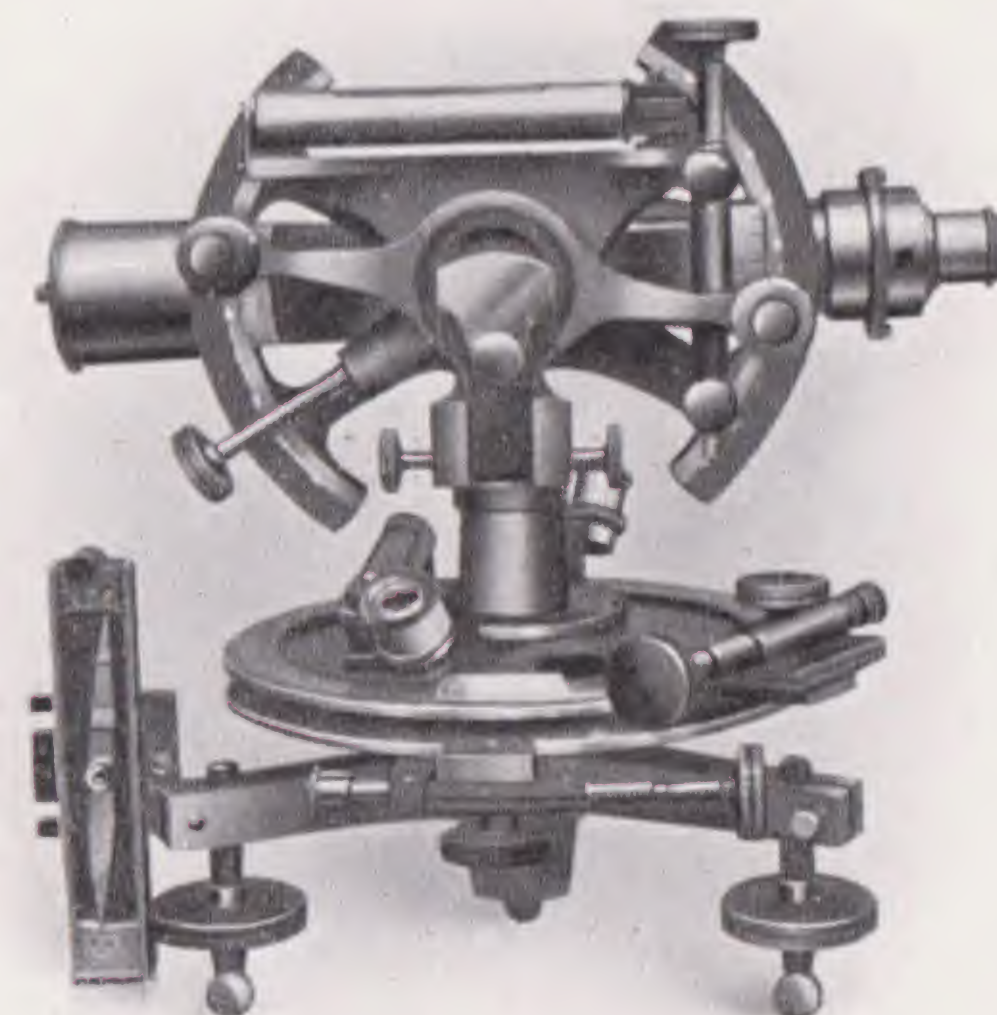
				PRICE			Code Word
				£	s.	d.	
No. 41—3in.	Tacheometer,	reading to	1'	24	10	0	Ilex
No. 42—4in.	„	„	1'	27	0	0	Iliace
No. 43—5in.	„	„	20" or 30" ..	30	0	0	Iliad
No. 44—6in.	„	„	20" ..	35	10	0	Ilium

Leather Cases, 30/- to 50/- according to size.

Y and Everest Theodolites



No. 48



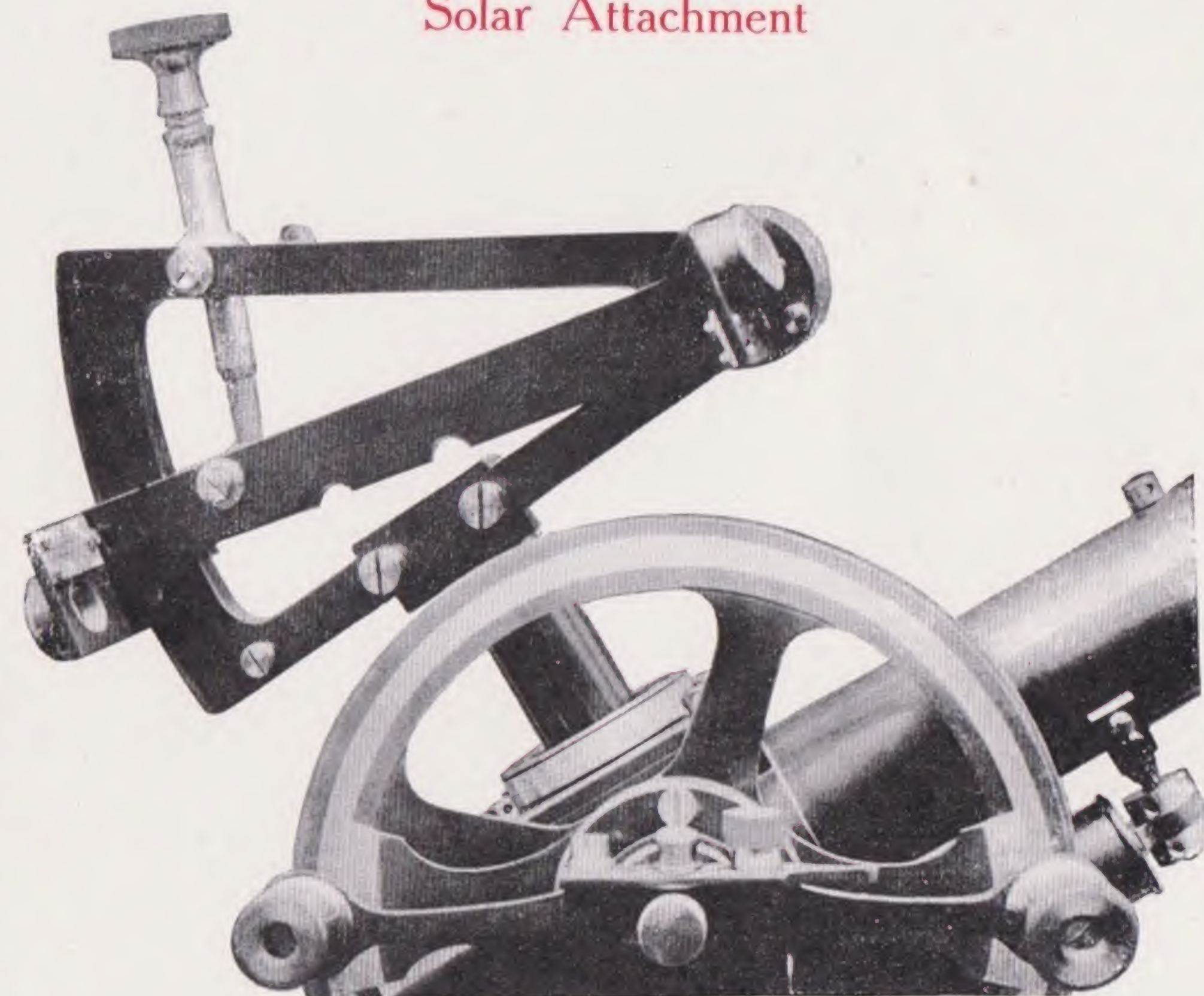
No. 49

- No. 48—5in. **Y Theodolite**, reading to 1', standards and upper plate in one solid casting, three-screw locking plate, or four-screw parallel plate adjustment, with centering motion, round compass ..
- No. 49—**Everest Theodolite**, reading to 1' or 30'', three-screw locking plate adjustment, trough compass. Indian Government Pattern
- No. 50—**Improved Omnimeter** (Eckhold's), 5in., reading to 20'' or 30'', three-screw or four-screw adjustment, with centering motion

Price		Code Word	
£	s. d.		
23	10 0	..	<i>Ilk</i>
26	0 0	..	<i>Illapse</i>
40	0 0	..	<i>Illate</i>

We make a large variety of Theodolites and Levels not included in this List, and on receipt of specification, quotations will be submitted for any instruments not found herein.

Solar Attachment



This attachment is largely used in America, its use being compulsory in all State surveys. With it the true or astronomical meridian can be determined, and horizontal angles can therefore be set off with minuteness and accuracy from a direction which never changes and which is unaffected by attraction of any description. In all instruments with a magnetic needle, the accuracy of the horizontal angles indicated, and therefore of all observations, depends upon the delicacy of the needle and the regularity with which it assumes a certain position, viz: the magnetic meridian. Error is very likely to occur through the pivot wearing, loss of magnetism in the needle, local attraction, &c., and the effect of the sun's rays. From all these influences the solar attachment is free.

It can be fitted to any of our Transit Theodolites, having vertical circle with clamp and tangent.

PRICE		Code Word	
£	s. d.		
No. 55—Solar Attachment	10 0 0	..	<i>Jacamar</i>
No. 56— „ „ „ (Light pattern) for "C. E." or any of our 3in. or 4in. Transits	7 0 0	..	<i>Jacent</i>

Mining Instruments, Accessories, &c.

Most of our standard instruments are suitable for use in mines, but it sometimes happens that in workings where the space is very restricted an instrument built very low is of great advantage.

The following instrument (No. 59) has been designed to meet these requirements.

	Price		Code Word	
	£	s. d.		
No. 59—Mining Transit Theodolite, 5in. horizontal circle, 3in. vertical circle, graduated to read by verniers to one minute, telescope transits eye end only, complete with reflecting cap for illuminating webs, trough compass, centering base, sliding tripod, diagonal eyepiece, powerful inverting eyepiece, and usual accessories	26	0 0	..	Imbed

The following Mining Accessories can be fitted to any of our Theodolites during construction:—

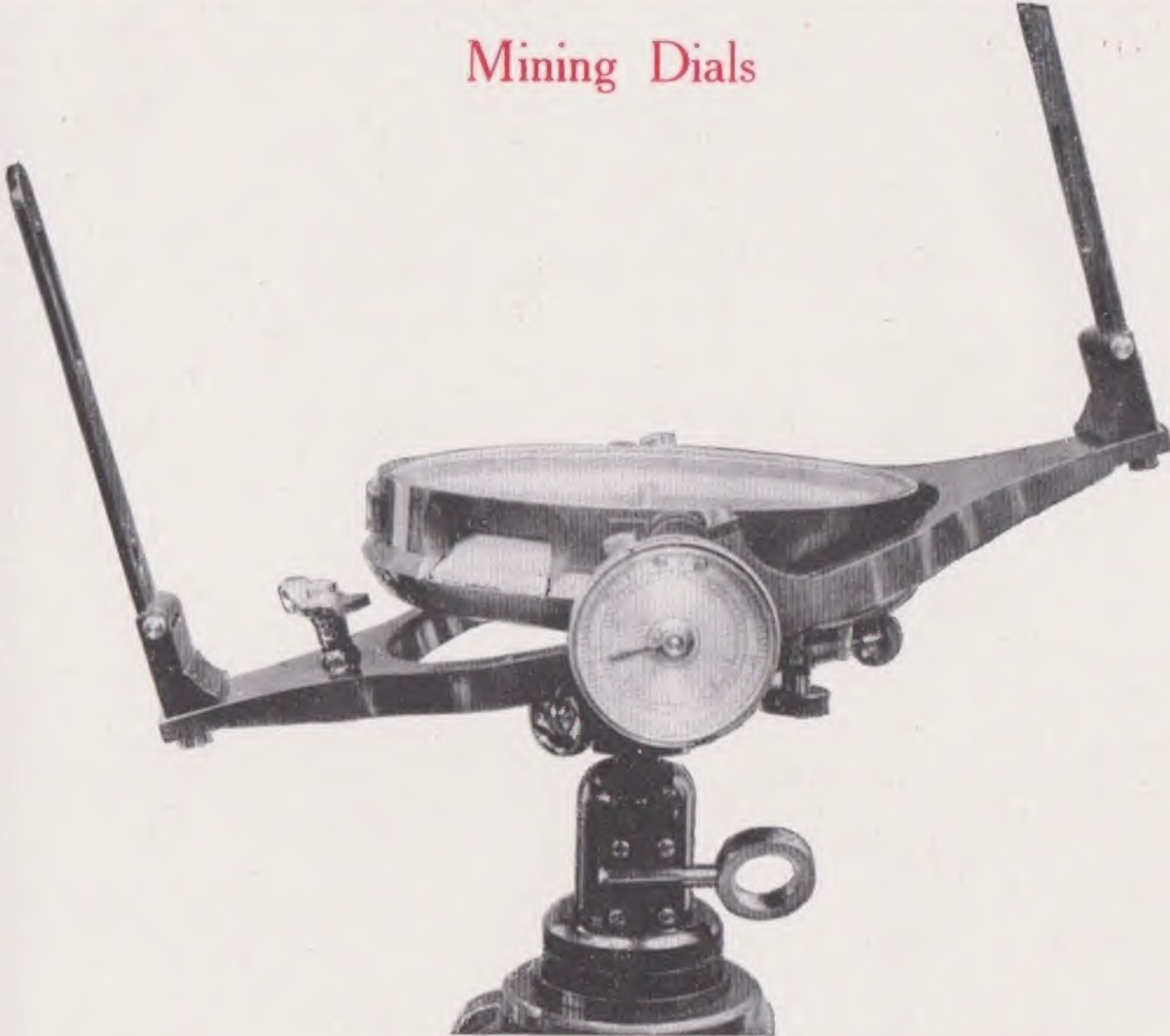
No. 60—Hoffman Joint and centering motion for rapid levelling in mines, on railway embankments, or very uneven ground, in place of the ordinary levelling adjustment, at an extra cost of	1	10 0	..	Imbue
No. 61—Auxiliary Telescope, for attaching either on top or at the side of the telescope axis of a Theodolite, for sighting up or down a shaft, complete with counterpoise weight, &c.	6	10 0	..	Imitate
No. 62—Luminous Targets, complete with levelling adjustment, two cross levels, clamp and tangent with swivel sighting cross, with standard sliding tripod and centering base .. each £10 0 0; per pair	19	0 0	..	Impart
No. 63—Candle Holders, to interchange with luminous targets described above (No. 62), each 15/-; per pr.	1	5 0	..	Imply
Nos. 62 and 63 are usually sold in pairs, and are made to interchange with the Theodolite with which they are to be used.				

No. 64—Plummet Lamps for mine surveying	1	10 0	..	Implied
No. 65—Hanging Compass, with separate clinometer ..	7	0 0	..	Imposer

For Mining Staves see pages 66-67

Tunnelling Instruments made to any specification to suit requirements, to order.

Mining Dials



No. 70

	Price		Code Word	
	£	s. d.		
No. 70.—Improved Hedley Dial, 5in. or 6in., with outside vernier, slow motion tangent screw and clamp, cross bubbles, vertical arc, with parallel plates or ball and socket joint, complete in case, with one set of improved sliding legs	16	0 0	..	Jaconet
Extra for telescope and supports in addition to sights.. ..	5	0 0	..	Jade

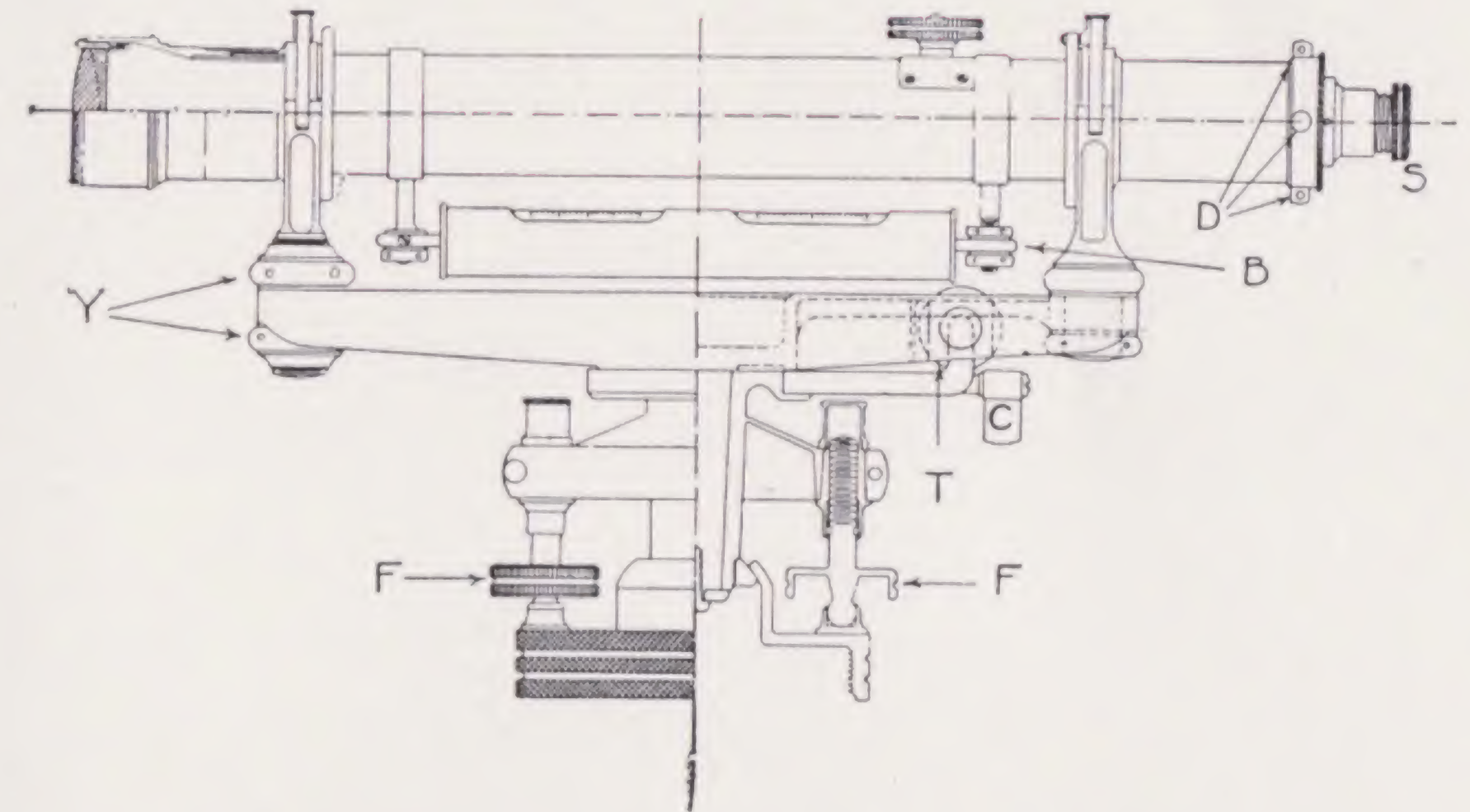
Rigid Dials

No. 71.—Plain Dial, 4in., with folding sights, two bubbles, parallel plates or ball and socket joint, complete in case with one set of sliding legs	6	0 0	..	Jaded
No. 72.—5in. ditto	7	0 0	..	Jading
No. 73.—6in. ditto	8	0 0	..	Jadish
No. 74.—Best Circumferentor, 5in., with folding sights, two bubbles, rackwork movement, vernier reading to three minutes, with graduated cover, parallel plates or ball and socket joint, complete in case with one set of sliding legs	10	5 0	..	Jag
No. 75.—6in. ditto	11	5 0	..	Jagged

Extras and Deviations from Standard Patterns of Theodolites and Levels

	Price each		
	£	s.	d.
No. 79.—Aluminium Box for Diaphragm	0	2	0
No. 80.—Astronomical Appendage, consisting of diagonal eyepiece, axis level, lantern, and reflector ..	3	10	0
No. 81.—Capstan Pin	0	0	6
No. 82.—Clamp Screws each	0	2	0
No. 83.—Diaphragm, plain	0	10	0
No. 84.—Diaphragm, stadia	0	12	6
No. 85.—Adjustable Stadia Diaphragm	1	2	6
No. 86.—EYEPIECE : Inverting screw-focussing	0	10	0
No. 87.—, , Inverting, with prism attachment ..	0	15	0
No. 88.—, , Erecting	1	0	0
No. 89.—, , Inverting Diagonal	0	15	0
No. 90.—, , Erecting Diagonal	1	5	0
No. 91.—Foot Screws each	0	3	6
No. 92.—Hood, for transit or level (shower-proof) ..	0	4	0
No. 93.—Leather Cases, best quality, with sling straps, for Theodolites, 30/- to 65/- according to size.			
No. 94.—Leather Cases, best quality, with sling straps, for Dumpy and "Y" levels, 30/- to 50/- according to size.			
No. 95.—Object Glasses from 12 6 to	1	15	0
No. 96.—Oil Bottles (metal) each	0	2	6
No. 97.—Reflecting Cap for illuminating diaphragm ..	0	15	0
No. 98.—Screwdriver	0	1	6
No. 99.—Spare Bubbles for 4in. or 5in. Theodolites—Small plate, 2/- each; Large plate, 3/6 each; Telescope Level, 5/6 each. (Larger sizes in proportion.)			
No. 100.—Spare Bubbles for levels—Telescope Level, 7/6 each; Cross Level, 2/- each.			
No. 101.—Striding, or Axis Level	1	10	0
No. 102.—Sun-glass	0	2	0
No. 103.—Sunshade from	0	3	0
No. 104.—Tangent (slow-motion) Screws each	0	3	0
No. 105.—Trough Compass	1	0	0
No. 106.—Two rows of figures to horizontal circle of Theodolites	0	15	0
No. 107.—Vernier Microscopes each	0	3	0

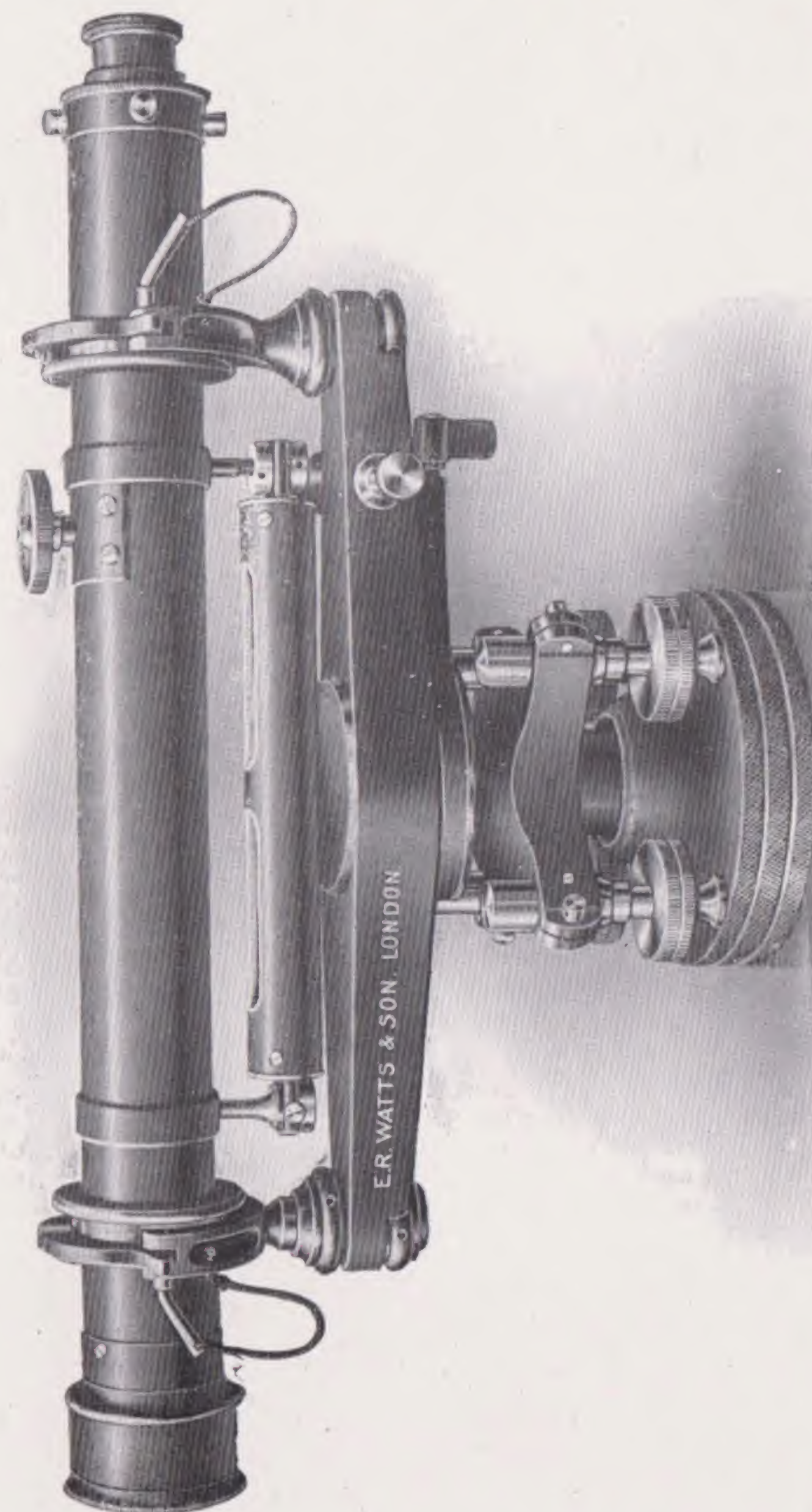
How to adjust a Y Level



- (1). See that the instrument is securely screwed home on its stand, and that the tripod itself is quite firm and rigid.
- (2). See that the telescope lays over two opposite foot-screws, and clamp the instrument by the clamp C.
- (3). Bring the air bubble of the Level to the centre of its run by means of the foot-screws FF.
- (4). Open the Y clips and reverse the telescope in its Y's, and if the air bubble does not come exactly in the centre again, adjust half the error with the bubble nuts B, and half with the foot-screws FF. Repeat this operation until the bubble remains in the centre of its run, whichever way the telescope lays in its Y's.
- (5). Revolve the instrument on its axis about 180°, and if the bubble is not in the centre of its run, adjust half the error by means of the Y nuts Y, and half with the foot-screws FF; then turn instrument 90°, so that the telescope lays over the other pair of foot-screws, and repeat this operation till the bubble remains correct in whatever position the instrument is turned on its axis.
- (6). Focus the telescope eyepiece on the wires with the screw-focussing arrangement S; then observe through the telescope some well defined object, and clamp the instrument with the horizontal wire on a selected point. Revolve the telescope in its Y's half way round, and if the horizontal cross wire does not come exactly on the same spot, correct half the error by means of the diaphragm screws D, and half with the tangent screw T. Revolve the telescope 1/4-turn, and correct the vertical wire in a similar manner. Repeat this operation till the point of intersection of the webs remains stationary when the telescope is revolved.
- (7). Whilst adjusting the collimation of the wires (operation 6), see that when the Y clips are home in the Y's, the webs are exactly horizontal and vertical.

The "C.E." Y Level (15in. size)

(Improved Pattern of Great Precision)



No. 120

Resulting from our experience, gained from both actual contact with Engineers and close observation in our Repair Shops, we have now entirely remodelled our Y and Dumpy Levels, and feel sure that in their present form they will be greatly appreciated by the profession.

Every detail of these instruments has been carefully considered, resulting in **lightness, strength, accuracy, and permanency of adjustment.** There are also other useful points which will, we think, place them beyond anything at present on the market. **Weight, 8½ lbs.**

Specification

Telescope. The Telescope has a clear aperture of $1\frac{5}{16}$ in. and a focal length of $14\frac{1}{4}$ in. Two Screw Focussing Inverting Eyepieces are supplied, giving powers of 20 and 40 diameters. (We also make this instrument with Erecting Eyepiece.) Stadia Web Diaphragm, Dust-cap, Ray Shade, and Dust-guard to draw.

Material. It is constructed throughout of hard phosphor bronze and tough gun metal. The Axis and Limb are now combined in one solid casting of phosphor bronze. The Axis has a very large dust-tight bearing face.

Slow-motion Screw and Clamp of improved design.

Levelling Adjustment. Three-screw or Four-screw. Each screw is protected by dust-caps for its entire length, and has also an adjustment for taking up wear.

Tripod. Round, Split-leg, or Extension Tripod as required.

Accessories. A Spare Glass Stadia Diaphragm, Spare Bubble, and a Waterproof Hood for instrument is packed in each box, in addition to the usual accessories.

For instructions for the adjustment of the instrument, with diagram, are placed in the lid of the box.

Weight, 8½ lbs.

PRICE

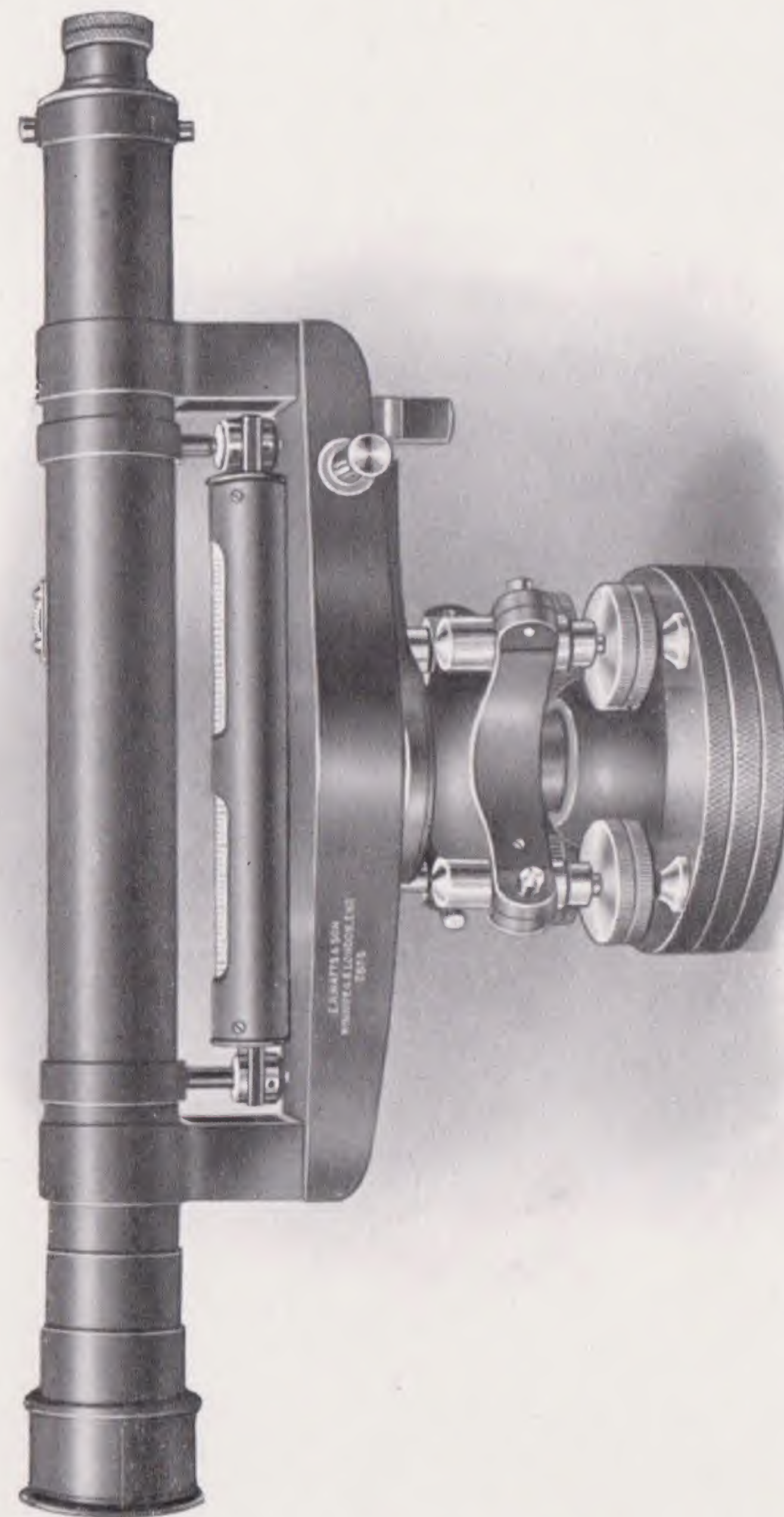
Code Word

No. 120 £16 0 0 Invest

Extra: Leather Case, £1 10 0

"C.E." Dumpy Level (15in. size)

Improved Pattern



No. 122

One of the important features of our new pattern "C.E." Dumpy Level is that the level is attached to the telescope, and is fixed underneath it, which not only affords far greater protection from damage than the usual pattern, but also renders it less susceptible to changes of temperature, being shaded from the sun by the telescope.

Specification

Telescope. The Telescope has a clear aperture of $1\frac{5}{16}$ in., and a focal length of $14\frac{1}{4}$ in. Two Screw Focussing Inverting Eyepieces are supplied, giving powers of 20 and 40 diameters. (We also make this instrument with Erecting Eyepiece.) Stadia Web Diaphragm, Dust-cap, Ray Shade, and Dust-guard to draw.

Material. It is constructed throughout of hard phosphor bronze and tough gun metal. The Axis and Limb are now combined in one solid casting of phosphor bronze. The Axis has a very large dust-tight bearing face.

Slow-motion Screw and Clamp of improved design.

Levelling Adjustment. Three-screw or Four-screw. Each screw is protected by dust-caps for its entire length, and has also an adjustment for taking up wear.

Tripod. Round, Split-leg, or Extension Tripod as required.

Accessories. A Spare Glass Stadia Diaphragm, Spare Bubble, and a Waterproof Hood for instrument is packed in each box, in addition to the usual accessories.

Weight, $7\frac{3}{4}$ lbs.

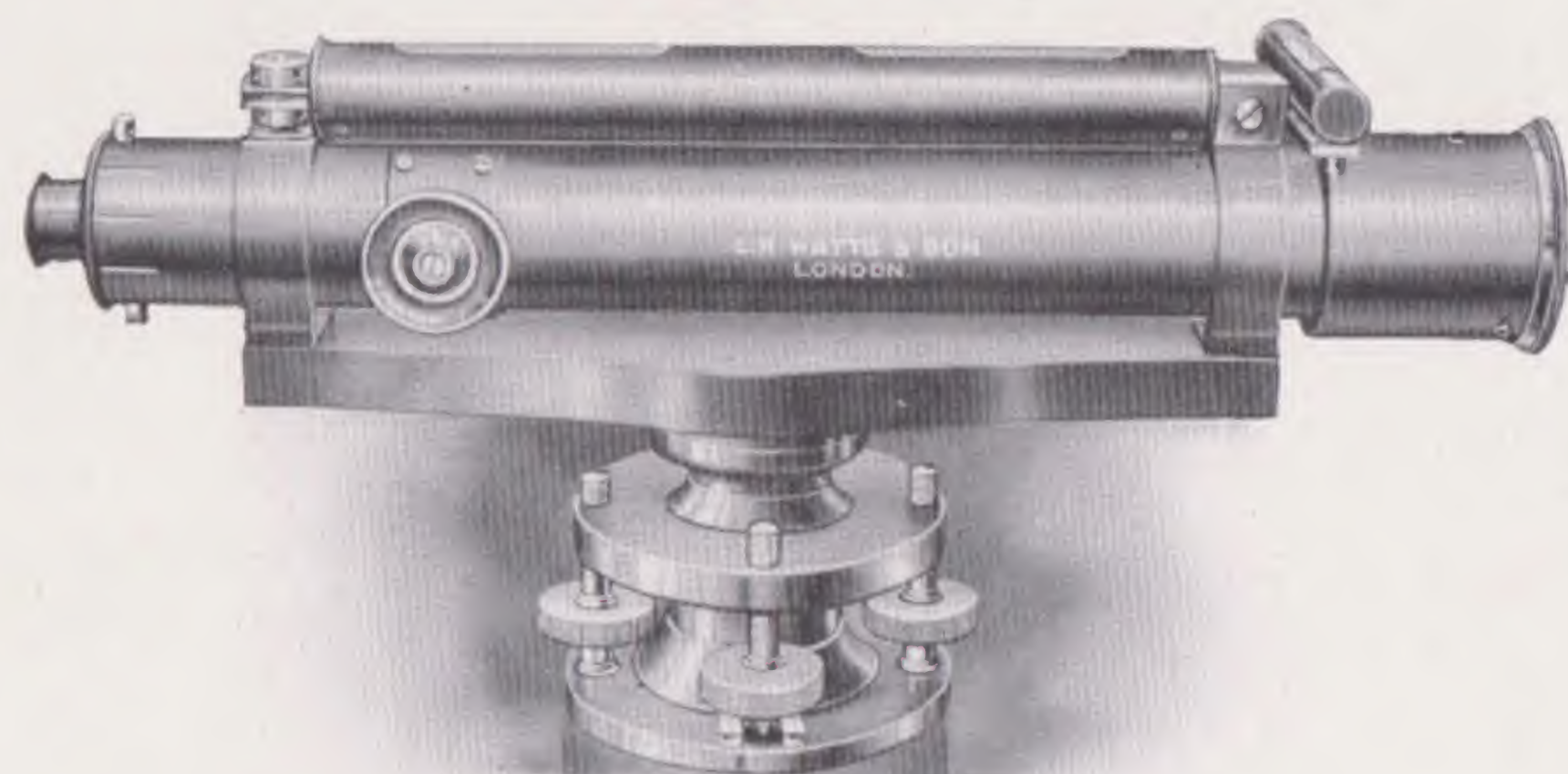
PRICE

Code Word

No. 122 £15 0 0 *Iward*

Extra: Leather Case, £1 10 0

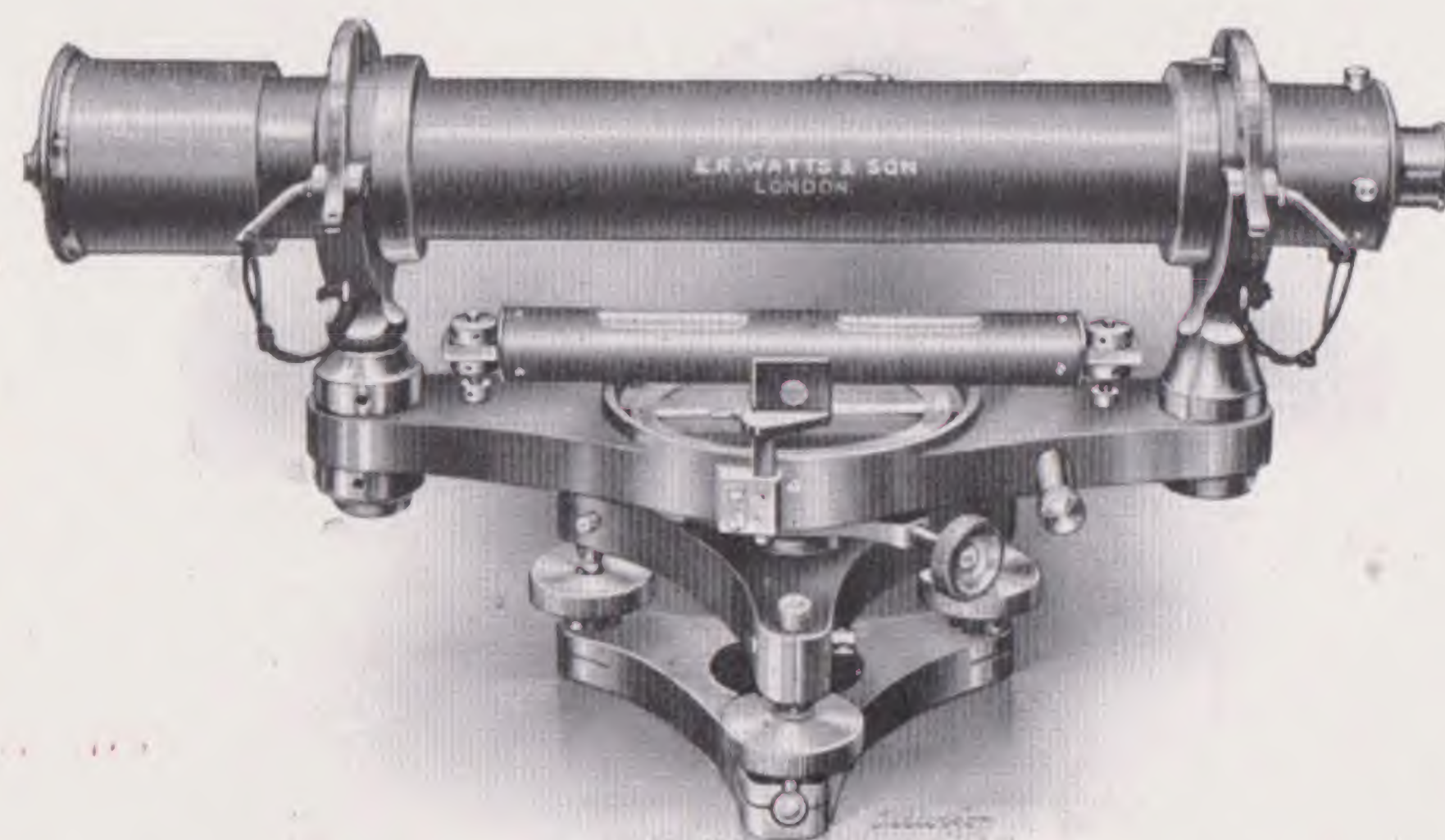
Dumpy Levels



Nos. 125—129

Weight of instrument, 12in. size .. 8lbs. 6ozs

Y Levels



Nos. 130—133

Weight of Instrument, 12in. size .. 10lbs. 14 ozs.

Dumpy and Y Levels. Ordinary Pattern

Axis and limb made in one casting of hard phosphor bronze, the axis having a very large bearing face.

The measurement of these Levels is taken from the focal length of the object glass. For example, a 12in. level has a 12in. focus object glass, and the total length of the telescope would be about 14in.

Specification

Telescope. Powerful Achromatic, with two Inverting Screw Focussing Eyepieces.

Levelling Adjustment. Four-screw parallel plates; or if preferred with three-screw and locking-plate adjustment, the price will be 10/- extra.

Tripod. Ordinary round pattern or split-leg.

Clamp and Slow-motion Screw, of improved design, which is always in the same relative position to the observer. Included in price of Y Levels, but for Dumpy Levels 15/- extra.

Compass. Aluminium Ring Compass, reading to half degrees. Fitted with Prismatic Reader. Price £1 2 6 extra.

Y Levels can be supplied with the bubble on the telescope, but unless otherwise specified the instrument will be sent with bubble attached to the stage as illustrated.

PRICE

Code Word

	£	s.	d.	
No. 125.—10in. Dumpy Level, without compass ..	9	5	6	<i>Into</i>
No. 126.—12in. „ „ „ „ ..	10	5	6	<i>Inter</i>
No. 127.—14in. „ „ „ „ ..	11	5	6	<i>Incur</i>
No. 128.—16in. „ „ „ „ ..	12	10	6	<i>Intas</i>
No. 129.—18in. „ „ „ „ ..	13	15	6	<i>Intact</i>
No. 130.—12in. Y Level, without compass ..	10	15	6	<i>Iveigh</i>
No. 131.—14in. „ „ „ „ ..	12	0	0	<i>Invoke</i>
No. 132.—16in. „ „ „ „ ..	13	10	0	<i>Invoked</i>
No. 133.—18in. „ „ „ „ ..	14	15	0	<i>Invoking</i>

Ordnance Pattern Y Levels

with large diameter telescope.

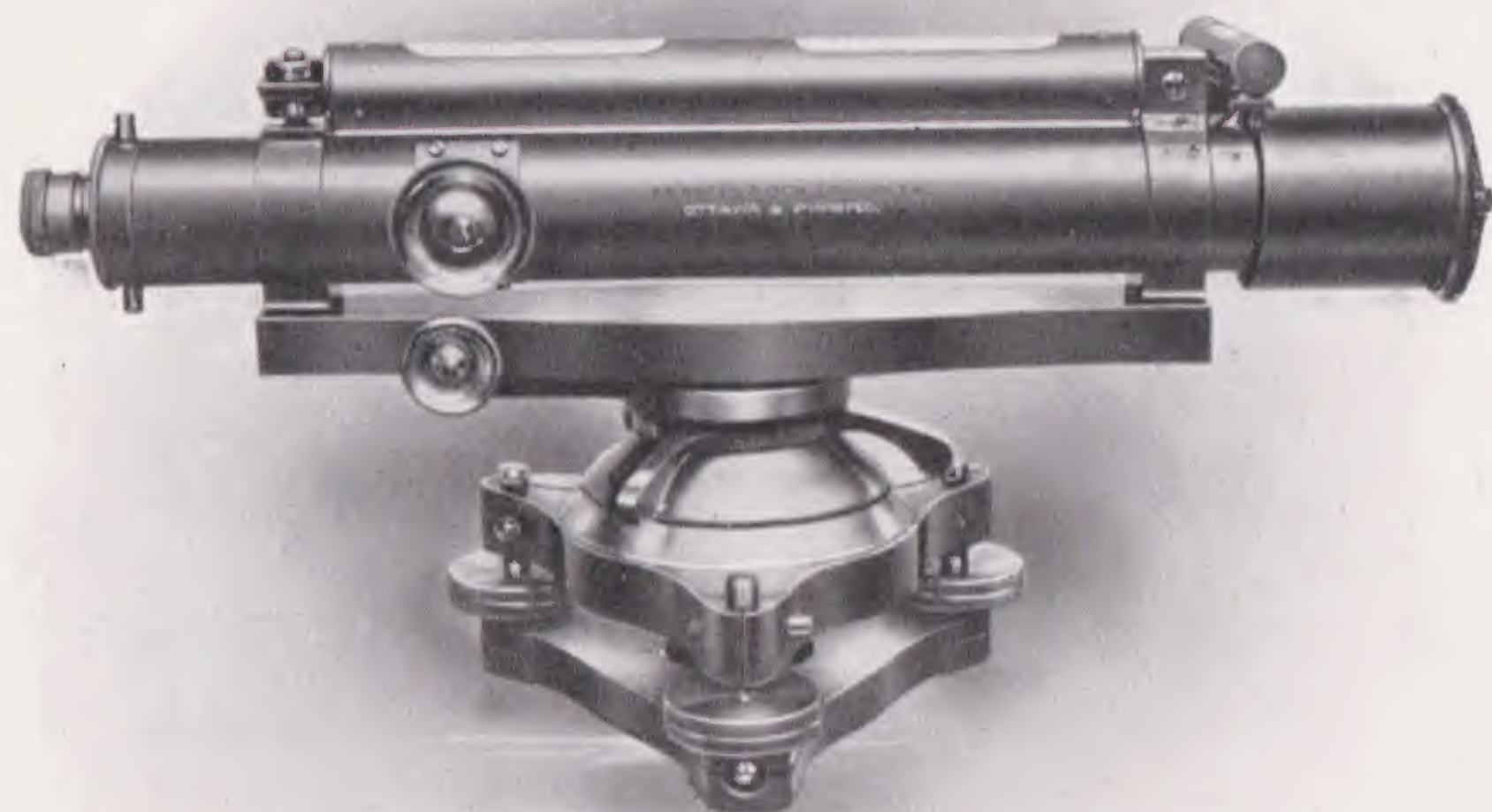
PRICE

Code Word

	£	s.	d.	
No. 134.—12in. Ordnance Y Levels, without compass	10	17	6	<i>Iodic</i>
No. 135.—15in. „ „ „ „ ..	12	2	6	<i>Iodide</i>
No. 136.—18in. „ „ „ „ ..	13	2	6	<i>Iodize</i>

Extras: Clamp and slow-motion screw for Dumpy Levels .. £0 15 0
Compass 1 2 6
Three-screw in place of four-screw adjustment .. 0 10 0

Railway or Quick-setting Level



Nos. 140—141

This instrument has been designed for rapid levelling on very uneven ground, such as railroad embankments, &c. In addition to our improved three-screw and locking plate levelling adjustment, it has a quick setting ball and socket arrangement. Clamp and slow-motion screw of new design is also provided. This instrument will be found exceedingly rigid and convenient.

[illegible]

10in. Builders' or Drainage Level

This is a cheap and simple form of our ordinary Dumpy Level, without compass, fitted with four-screw parallel plate adjustment.

PRICE **Code Word**

No. 144—Complete with light tripod and case £4 10 0 *Intense*

Reversible Levels (Cooke's Pattern)

Three-screw and locking plate adjustment (same as we supply to the British Government).

The 10in. size has an ordinary round pattern tripod, but the 14in. size has an open-framed stand.

		Price	Code Word
		£ s. d.	
No. 146—10in., with compass	13	0 0	<i>Ion</i>
No. 146A— „ without compass	12	5 0	<i>Ionz</i>
No. 147—14in., with compass	16	0 0	<i>Ionian</i>
No. 147A— „ without compass	15	0 0	<i>Ionianz</i>
Clamp and Slow-motion screw £1 extra.			

Architects' Levels

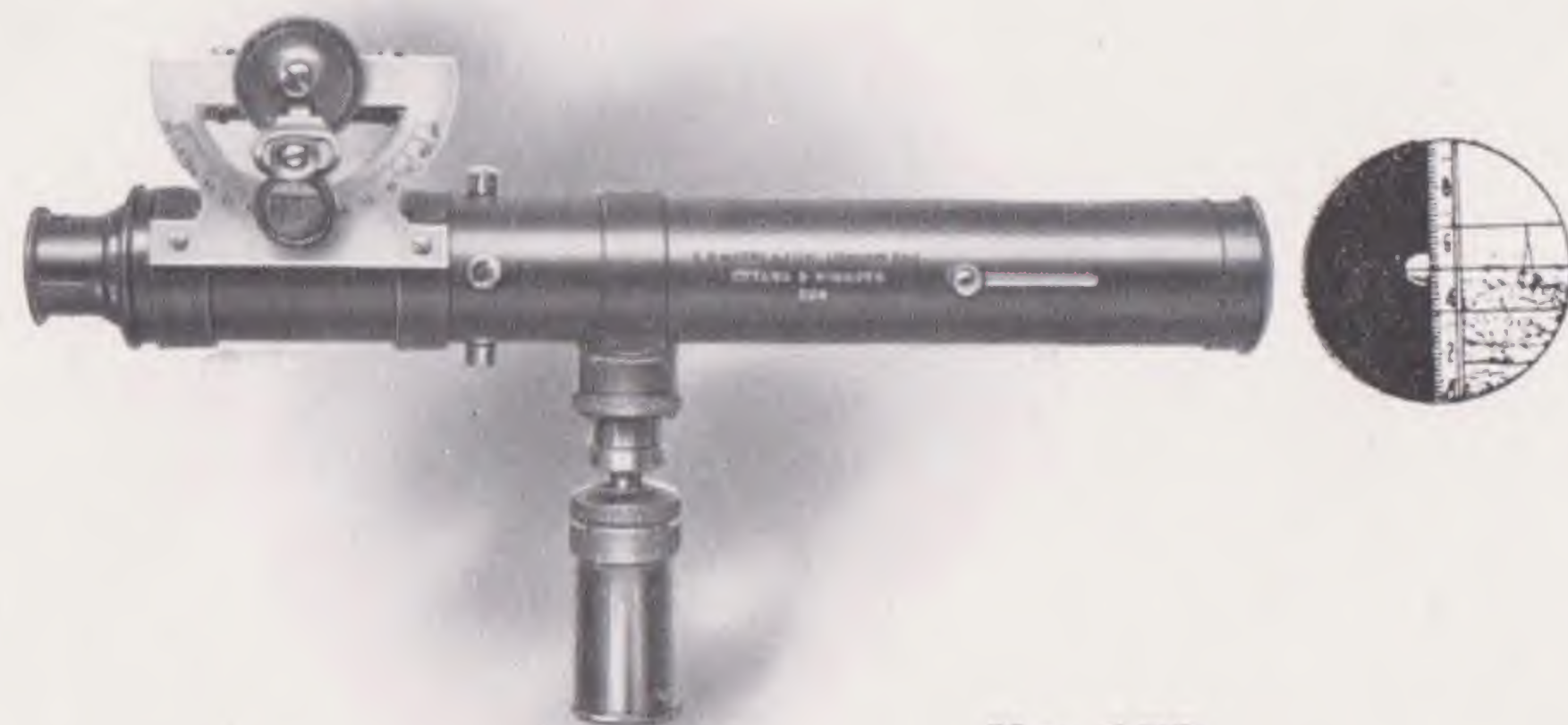
These instruments are specially adapted for all ordinary requirements of Architects, Builders, and Engineers, such as the laying out of buildings, street or floor levelling, drainage or sewer work, or for the accurate setting of machinery shafting.



No. 149

No. 149—10in.	Architects' Dumpy Level, with graduated circle for reading horizontal angles by vernier to 3', with light tripod	Price £ s. d.	Code Word
		9 15 0 ..	<i>Ionic</i>
No. 150—12in.	Architects' Y Level, with 3in. circle graduated to degrees, reading by vernier to 5' for determining horizontal angles, figured 0—90 degrees each way, with light tripod	12 10 0 ..	<i>Intend</i>

Stadia Level



No. 153

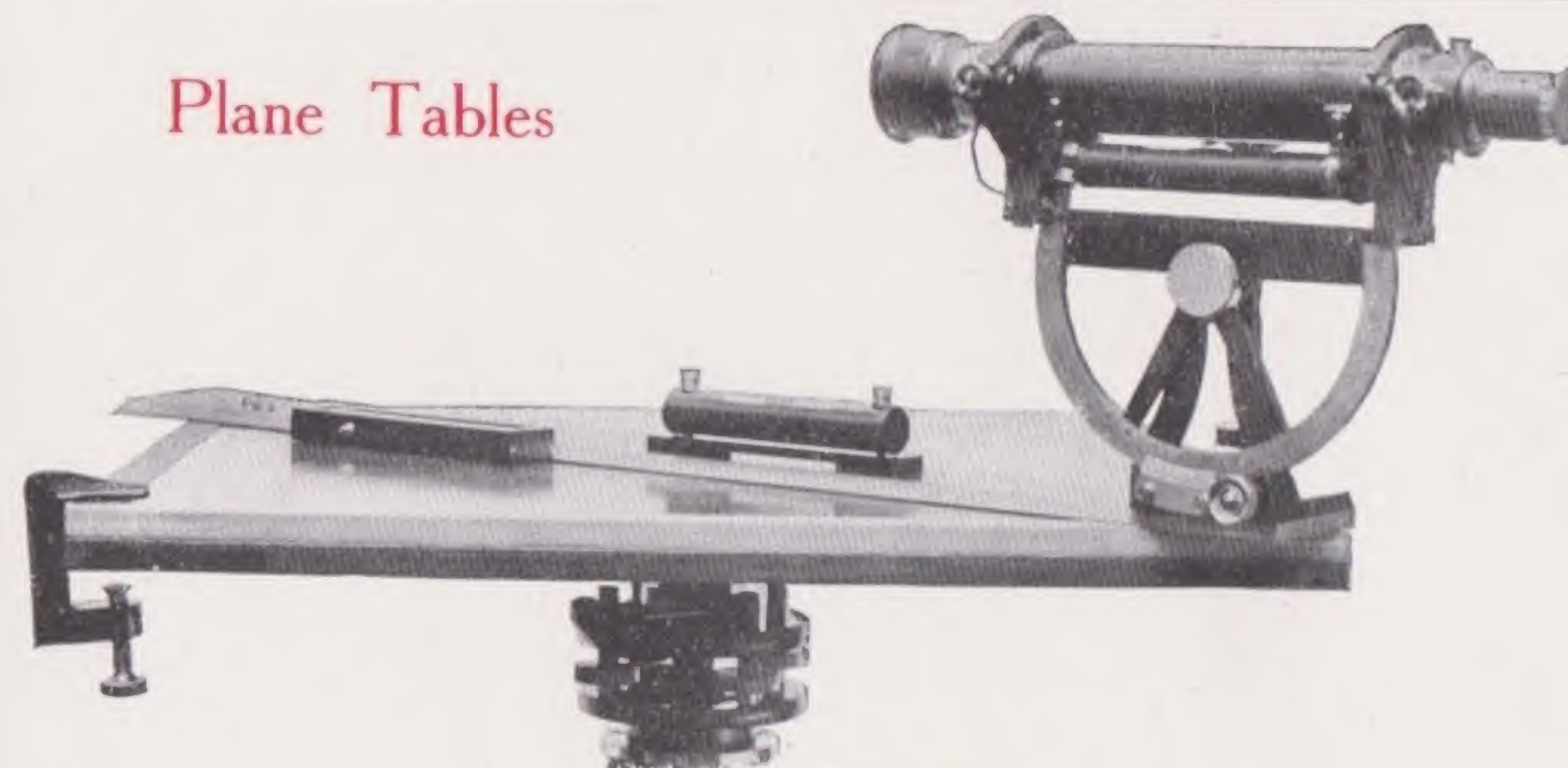
The above instrument has been designed for reconnaissance work, where lightness and portability are of the utmost importance. It has a 10in. telescope with 1in. clear aperture; fitted with stadia platinum wire diaphragm arranged to read 1-100. **The bubble, stadia wires, and the staff are all visible through the telescope at one and the same time, as shown in the illustration.**

A Jacob Staff Mounting, with ball and socket joint, is supplied with each instrument. **Weight about 1½ lbs.** Complete with leather sling case.

In conjunction with one of our Pocket Levelling Tapes or Portable Staves (see page 67) this instrument makes a very suitable and convenient outfit for preliminary surveys.

	PRICE		Code Word	
	£	s.	d.	
No. 153— Stadia Level , with arc and vernier for reading vertical angles and inclines, and magnifying lens on movable arm	3	17	6	<i>Iodous</i>
No. 154— Ditto but without arc	3	7	6	<i>Ioduret</i>
No. 155— Polished Oak Tripod , clamping by means of bolts, with cone fitting	0	10	0	<i>Iolite</i>
No. 156— Metal Tripod , closing to 11¼in., reversible toes of steel and india-rubber for hard surfaces where the points might slip. Weight 21 ozs.	1	2	0	<i>Iota</i>
No. 157— Solid Leather Sling Case , for No. 156 Tripod	0	7	6	<i>Ips</i>
No. 158— Jacob Staff , with steel shoe	0	3	6	<i>Ipsa</i>

Plane Tables



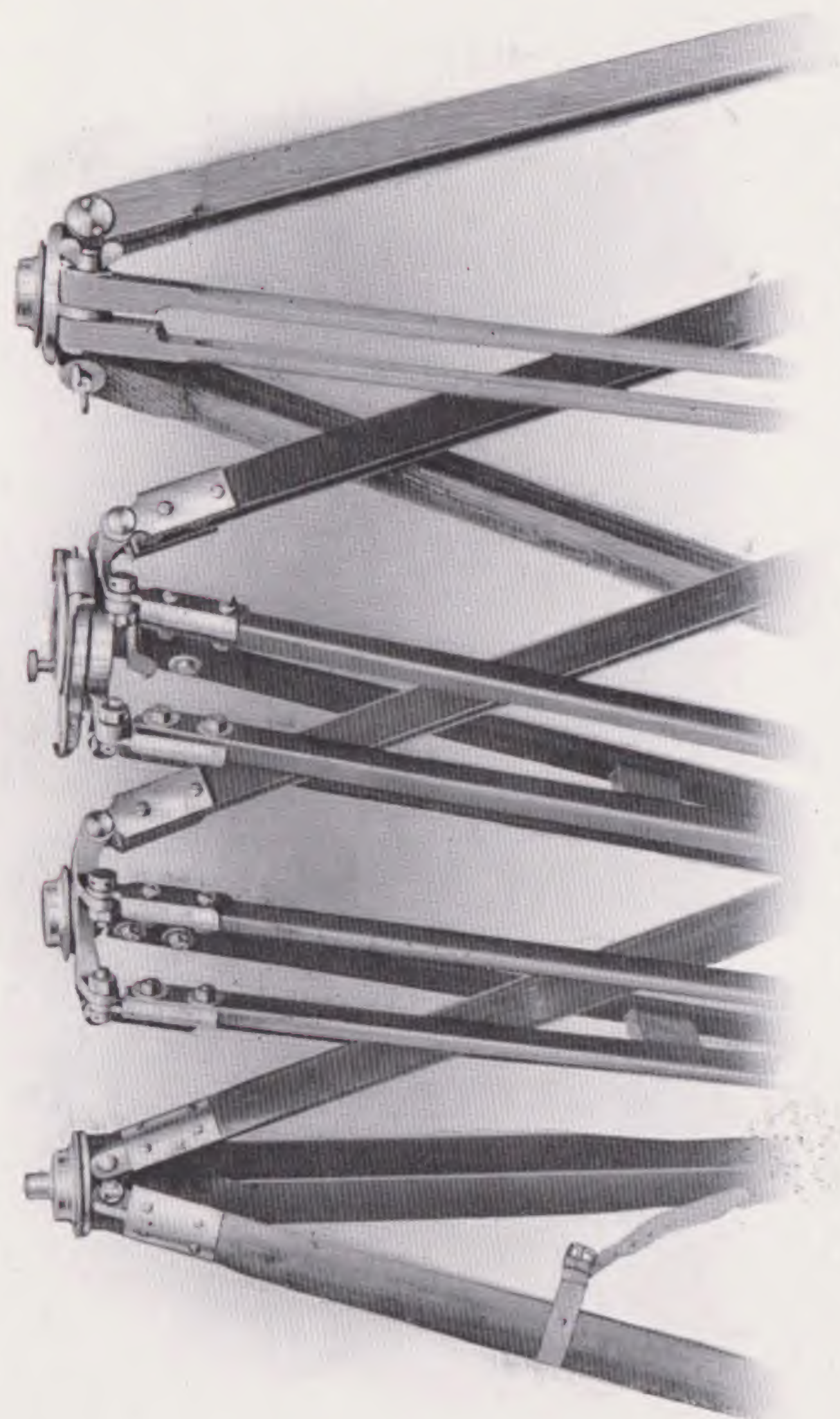
No. 160

Price Code Word

	£	s.	d.	
No. 160— Plane Table with Alidade reading to one minute, with telescope and collars, trough compass, two levels, arrangement for clamping paper on table, with four-screw levelling adjustment and clamp, complete with tripod and case	16	0	0	<i>Jaggy</i>
No. 161— Plane Table , board 13½in. × 11in., trough compass, sight rule and straight-edge, complete with tripod, cover, and sling straps	4	5	0	<i>Jagger</i>
No. 162— Sequoia Plane Table , 24in. × 18in., suitable for the colonies, with mahogany slotted battens, 12in. sight rule, 4in. boxwood trough compass, teak tripod with metal top, waterproof canvas cases for board and tripod, pockets being provided for rule and compass ..	3	7	6	<i>Jarde</i>
No. 163— Kauri Pine Plane Table , 12in. × 10in., polished, with boxwood ends, metal rollers for winding paper, with two-fold polished tripod stand, with 3in. top and brass fittings	1	5	0	<i>Jashawk</i>
No. 164— Cavalry Sketching Board , in polished mahogany, size of working surface 7½in. × 6in. (working surface unpolished), fitted with flange compass, bar needle, with line of direction etched on glass, slotted wood rollers with phosphor-bronze friction springs, rubber bands, boxwood straight-edge, and boxwood bottom cleat divided on front to scale H.E. 20ft. at 6in. to M., and on back to inches and tenths. A swivelled wide leather wrist strap is provided for attaching board to wrist	1	2	6	<i>Jole</i>

Plane Tables, Tripods, Sketching Boards, &c., to any specification and to suit special climates.

Stands for Theodolites, Levels, &c.



Nos. 169-171

No. 168

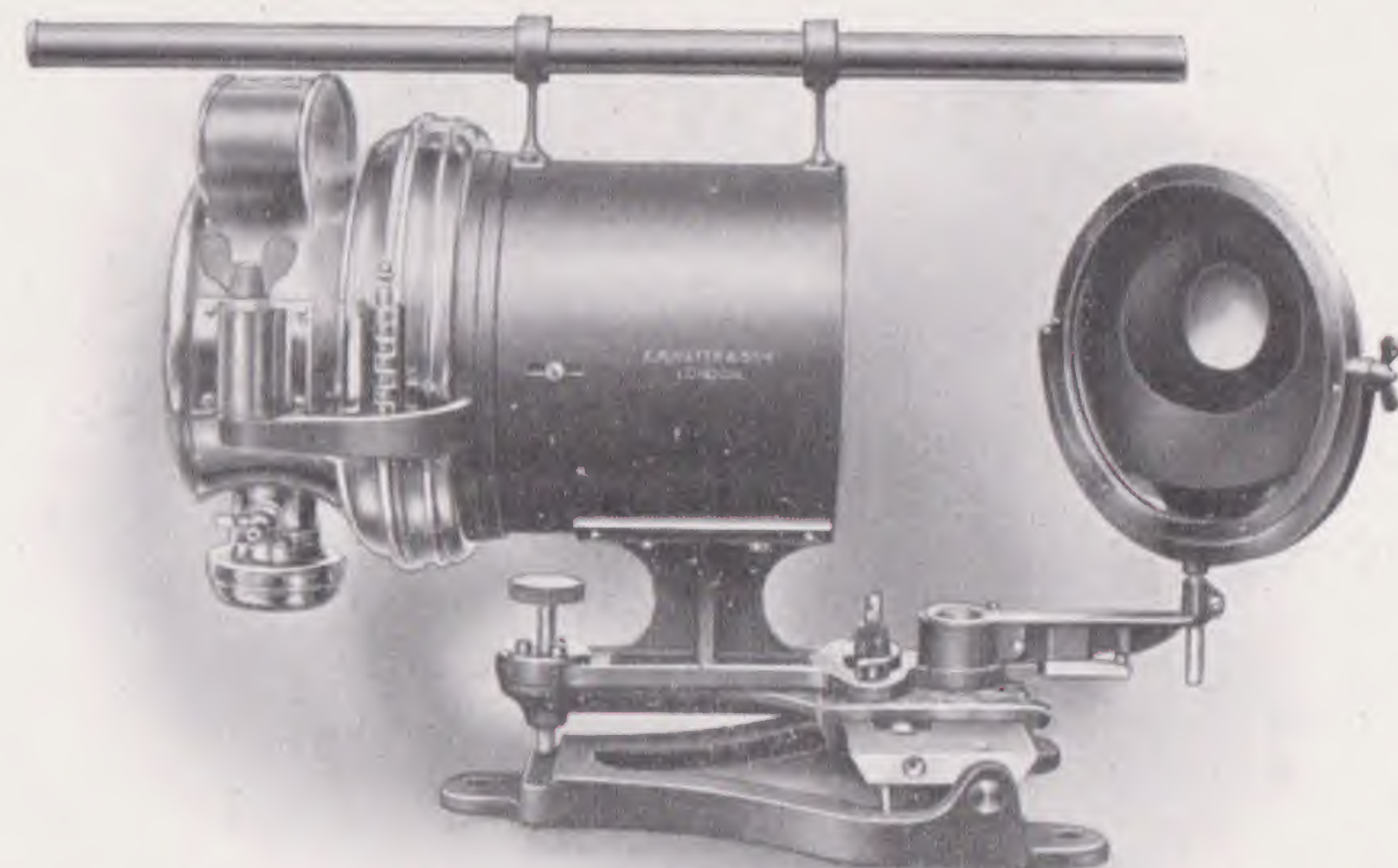
No. 167

No. 166

Specifications

	Price	Code Word
No. 166.—Ordinary Round Tripod	<i>f</i> 2 <i>s.</i> 2 <i>d</i> 0 ..	<i>Idyl</i>
No. 167.—Open Frame Stand	2 10 0 ..	<i>Idly</i>
No. 168.—Open Frame Stand, largely used in India and the Colonies. This stand is exceptionally strong and steady and has the centering arrangement and tribrach stage attached to it ..	4 0 0 ..	<i>Idle</i>
No. 169.—Split Leg Tripod. American pattern	2 0 0 ..	<i>Idol</i>
No. 170.— „ „ (one leg sliding)	2 10 0 ..	<i>Idolize</i>
No. 171.— „ „ (three legs sliding)	3 0 0 ..	<i>Idolist</i>
No. 172.—Light Tripod (Broomstick pattern), suitable for “Reconnaissance” Transit or Small Level	1 17 6 ..	<i>Idler</i>
No. 173.—Light Split Leg Tripod (three legs sliding), for “Reconnaissance” Transit	2 10 0 ..	<i>Idling</i>

Lamp for Use in Night Surveying

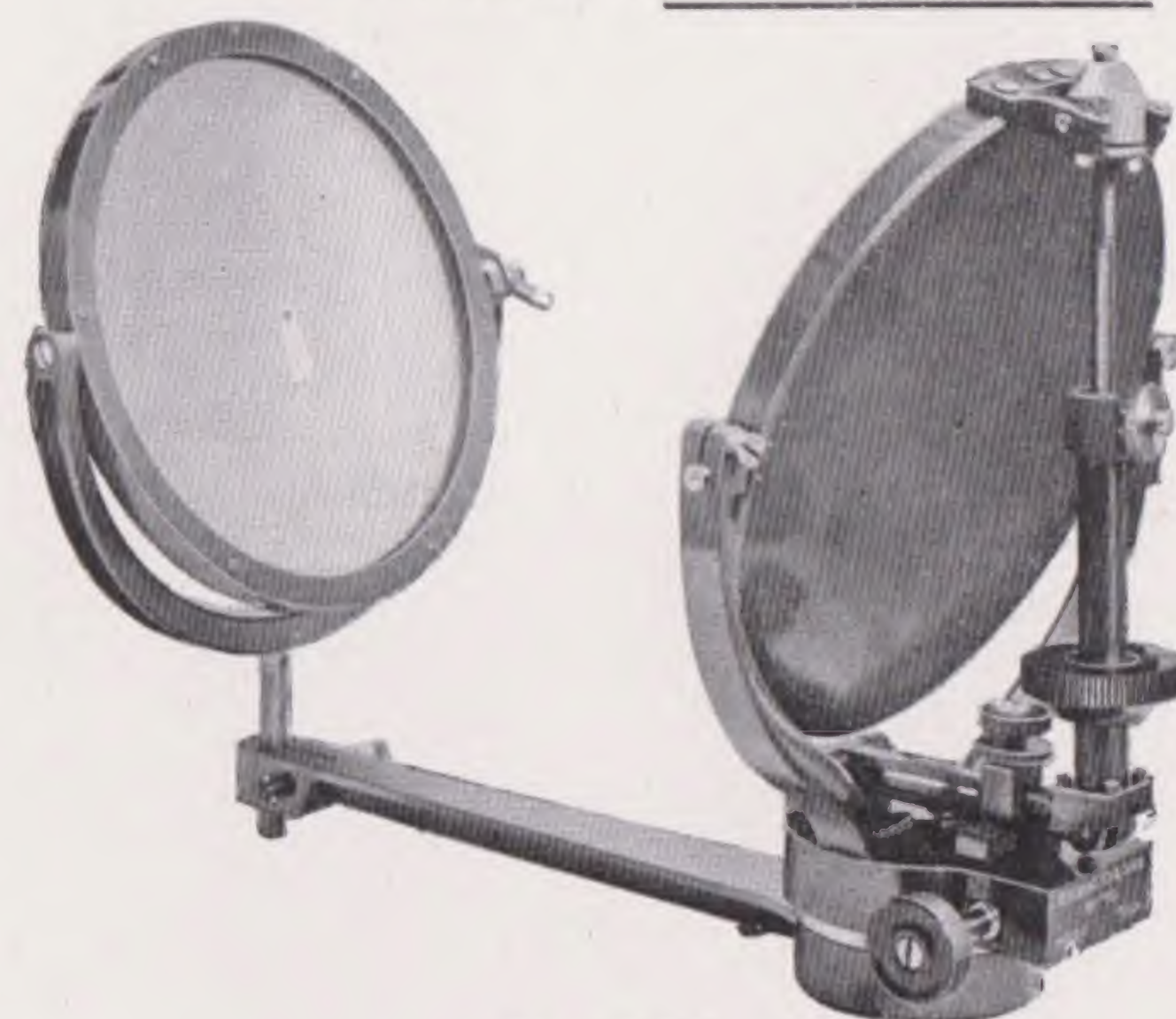


No. 180

When surveys are being made, it is sometimes an advantage, on account of the atmosphere and for other reasons, to do the work during the night.

The instrument we illustrate was designed by G. T. McCaw, Esq., M.A., to meet the requirements of an African Boundary Commission. It consists of an acetylene lamp of 600 candle-power intensity, complete with generator and all accessories. It has vertical and lateral adjustment to the base, also a movement in azimuth of about 20°. A heliograph mirror attachment is provided, also a sighting tube, so that the lamp can be accurately placed in position.

No. 180—Complete in case, with supply of calcium carbide **Price** **Code Word**
and all accessories £14 0 0 .. Acelamp



No. 181

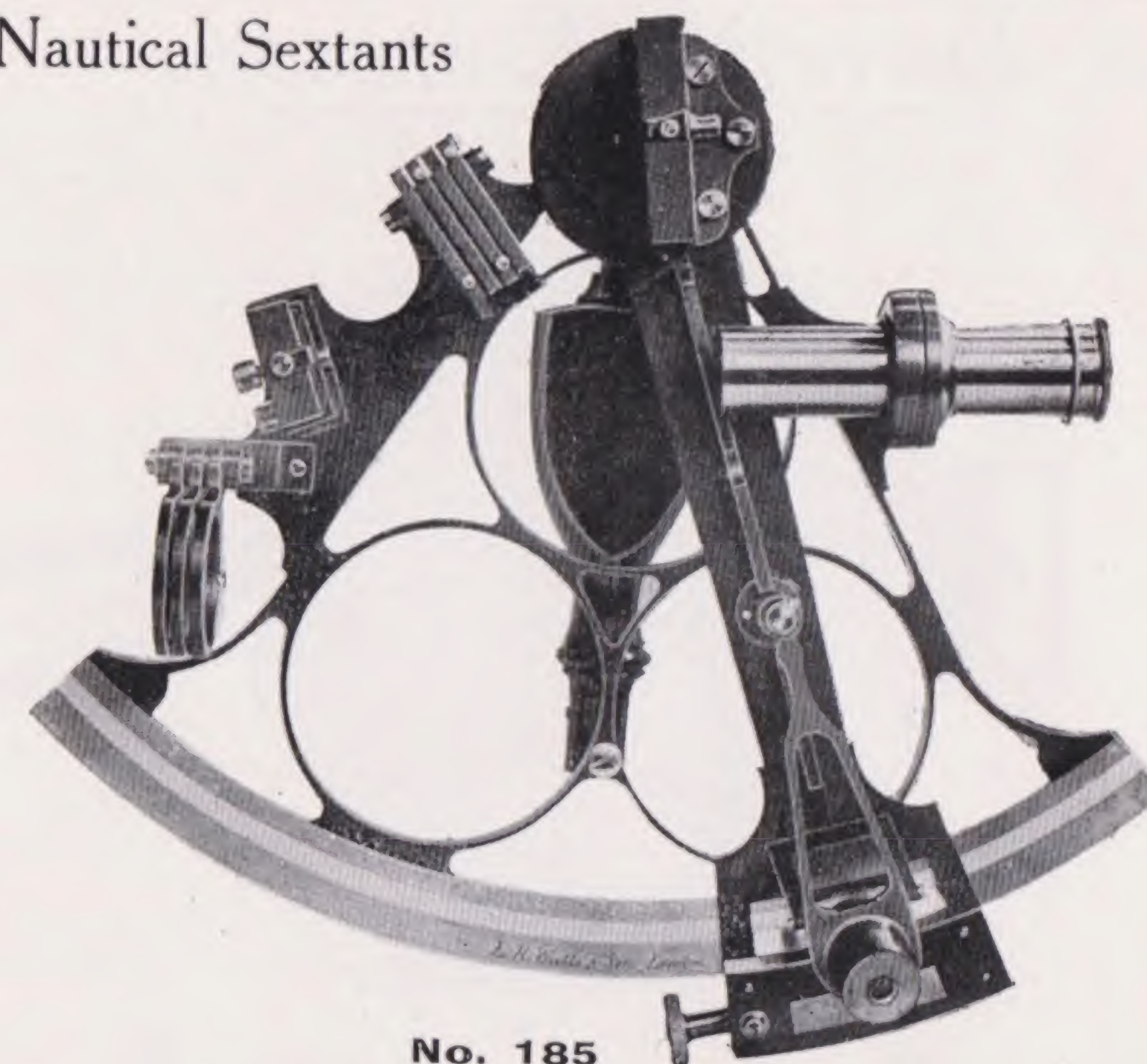
Heliographs

No. 181—5in., with two spare mirrors and various spare parts, packed in leather case with sling strap, complete with tripod.

Price **Code Word**
Each £12 10 0 .. Jorum

The above Heliographs are fitted with the finest possible worked parallel mirrors.

Nautical Sextants



No. 185

No. 185—6½in. Britannia Cadet's Sextant, made in hard Gun Metal, divided on Silver, and reading to 10". Same as made by us for the Admiralty. With Kew "A" Certificate **Price** **Code Word**
£ s. d. 9 5 0 Jackal
No. 186—6½in. Triangle Pattern, made in hard Gun Metal, divided on Silver, and reading to 10". With Kew "A" Certificate .. 10 10 0 Jackboot
No. 187—8in. Double Frame Sextant (Pillar Pattern), made in hard Gun Metal, divided on Silver, and reading to 10" 16 10 0 Jackdaw
Sextants can be divided on Platinum with Gold Verniers at an extra cost of £3 15 0 each.

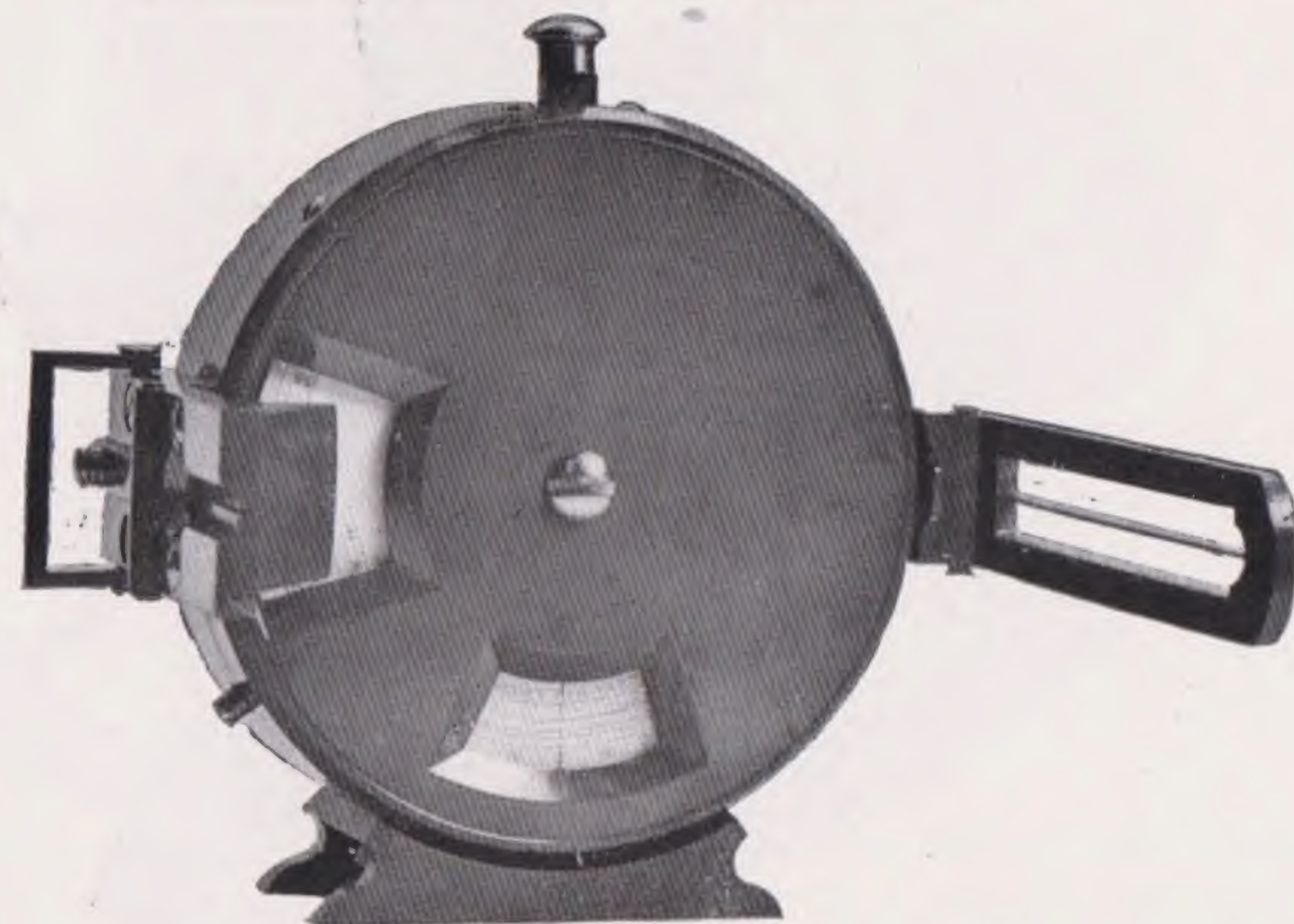
Station Pointers

No. 189—Three-arm protractor or Station Pointer, as supplied to the British Navy, 4in., divided on Brass to ½°, read from plain arrows, with arms 12in. long **Price** **Code Word**
£ s. d. 4 15 0 Jacket
No. 190—6in. do. do. do. 5 5 0 Jacobin
No. 191—6in., divided on Silver, and read by verniers to one minute, with tangent screws; arms to lengthen to 24in. 9 10 0 Jacobite

Artificial Horizons

No. 192—Plain black glass, Admiralty pattern, three levelling screws, two spare bubbles; in case **Price** **Code Word**
£ s. d. 2 2 0 Jagheer
No. 193—Mercurial Artificial Horizon, with best parallel glasses, iron trough and mercury bottle filled with mercury. Admiralty pattern packed in mahogany case 4 0 0 Jalap

Surveying Compasses



No. 196

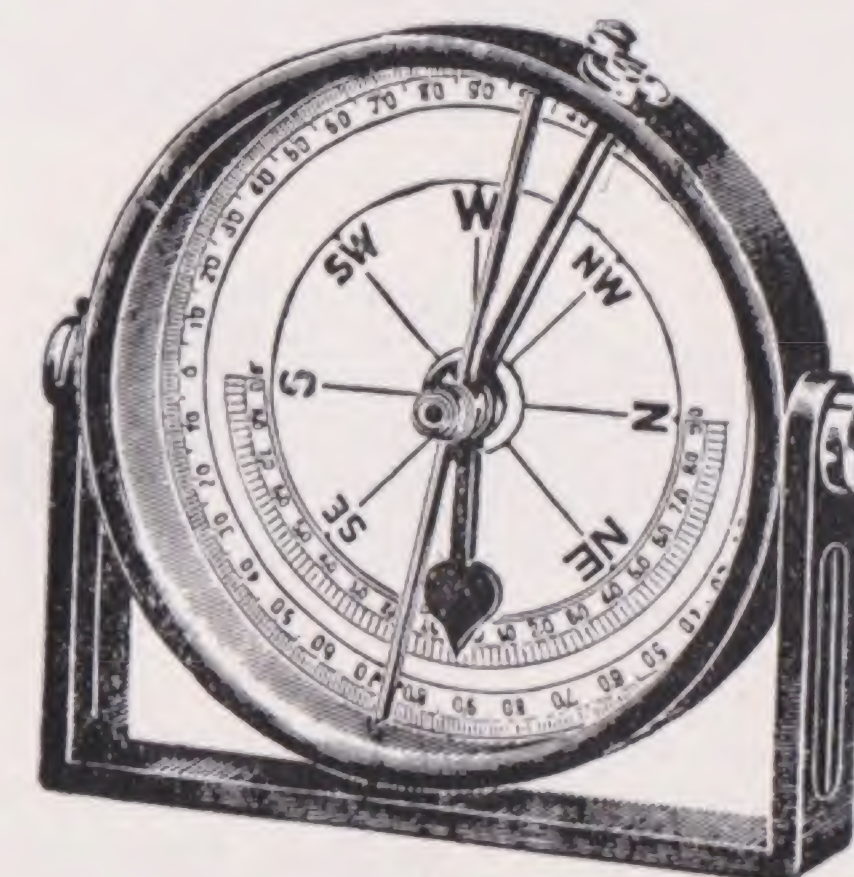


No. 197

..50..

Specifications

	Price	Code Word
No. 196—Combined Prismatic Compass and Clinometer, with metal altitude circle, showing scale of rise and fall in inches per yard, and aluminium compass ring, sling case, 3in.	£ s. d. 3 10 0 ..	Inclip
No. 197—Prismatic Compass, Hutchinson's Improved Form, with opening in cover, more portable than ordinary form, sling case 3in., £1 15 0; 4in.,	2 5 0 ..	Incline
Extras for No. 197 { (A) Azimuth Shades and Mirror	0 10 6 ..	Incloud
(B) Engine Divided Aluminium Ring	0 15 0 ..	Incog
No. 198—Sight Compass, in bronze metal case, with plain folding sights, silvered metal dial, bar needle, jewelled, and raised ring for divisions 2½in., 14/-; 3in.,	0 17 6 ..	Incise
No. 199—Jacob Staff, hardwood, steel shoe, for the above compasses, 54in. long	0 5 0 ..	Incite
No. 200—Extension Tripod, with ball and socket motion for the above compasses	1 10 0 ..	Incult
No. 201—Service Pattern Prismatic Compass, Mark VI., as supplied to the British Government, in leather sling case	3 12 6 ..	Jotted
No. 202—Service Pattern Mirror Clinometer, as supplied to the British Government	1 7 6 ..	Jounce

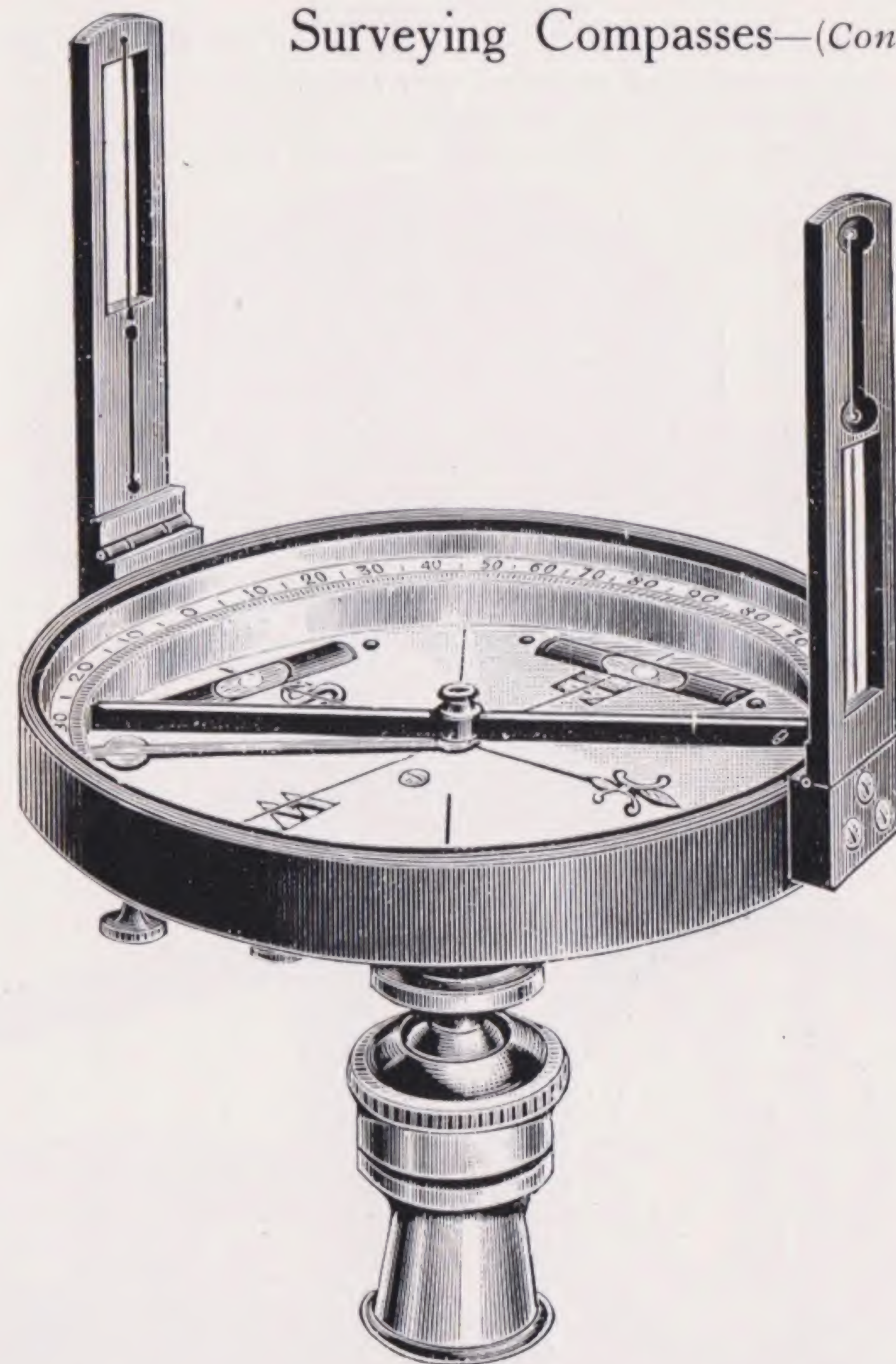


No. 203

No. 203—Clinometer Compass (sight compass and clinometer combined) bronzed case, bar needle, jewelled centre, in case complete, with silvered metal dial, 3in., £1 2 6; 4in.	£ s. d. 1 10 0 ..	Incide
No. 204—De Lisle's Clinometer and Reflecting Level for road tracing, marked for levels and gradients. In case	3 0 0 ..	Joust

..51..

Surveying Compasses—(Continued)



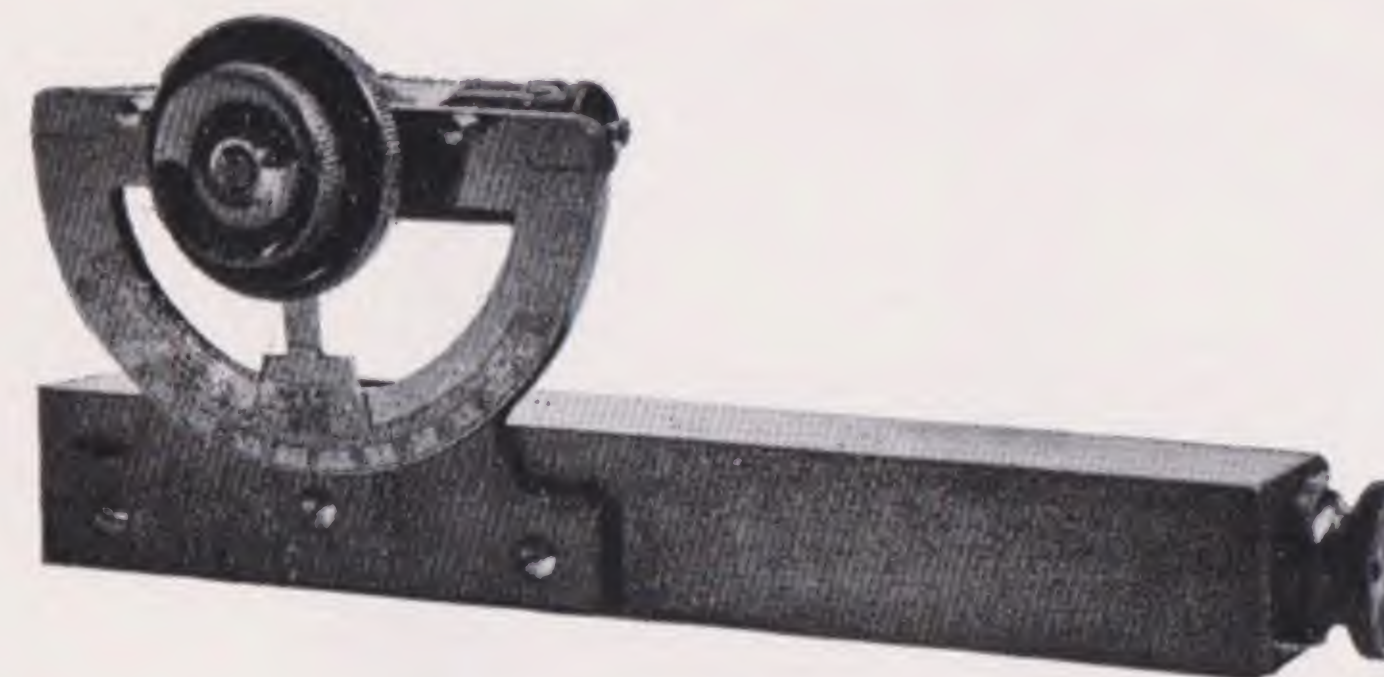
No. 210

- No. 210—Surveying Compass, with folding sights, on revolving ring, with vernier and scale for magnetic variations, with bar needle, jewelled, two spirit levels, ball and socket mounting (Jacob Staff) complete in mahogany case, 3½ in. £2 15 0 .. 4½ in.
- No. 211—6 in., without scale for variations .. 4 in.
- No. 212—Do. (cheaper form) 3 in. £2 10 0 .. 4 in.
- No. 213—Do. do. but without spirit levels, 2½ in. £1 10 0, 3 in. £1 15 0 .. 4 in.

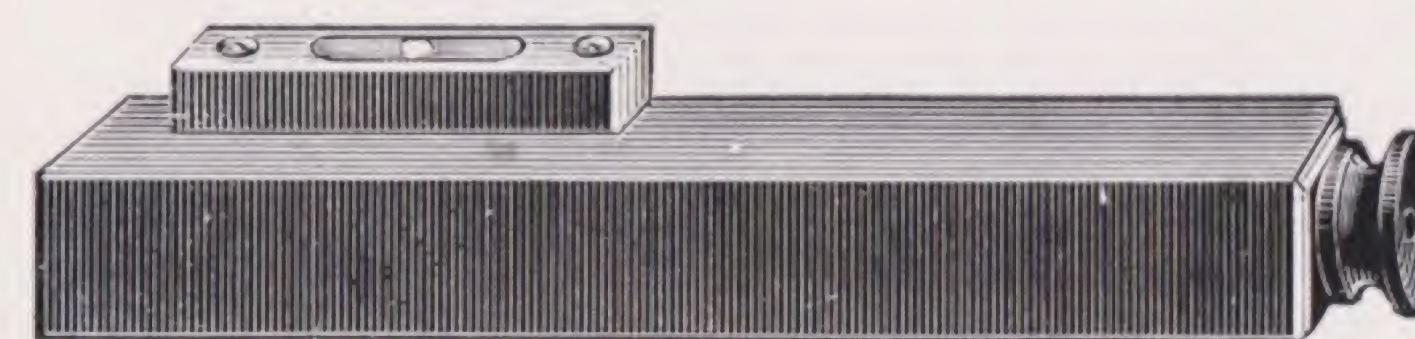
Price Code Word
£ s. d.

3 3 0 .. Jangle
4 10 0 .. Jangler
2 15 0 .. Janitor
2 0 0 .. Japan

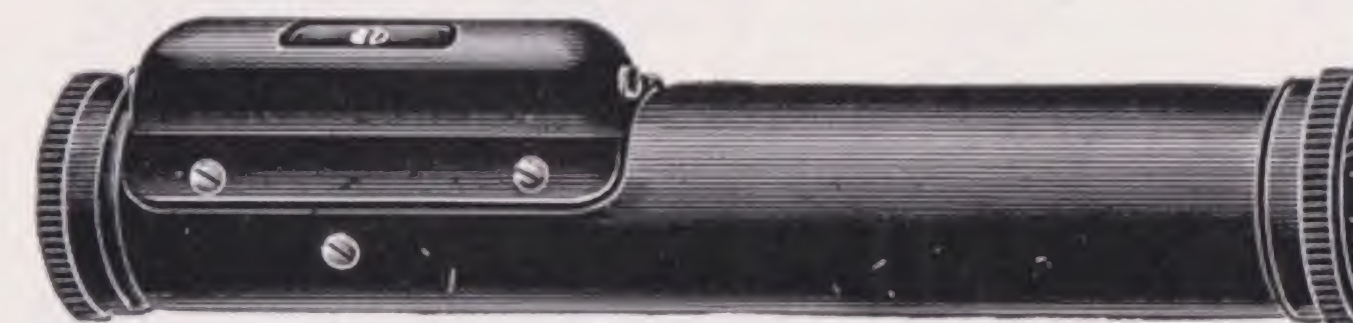
Hand Levels



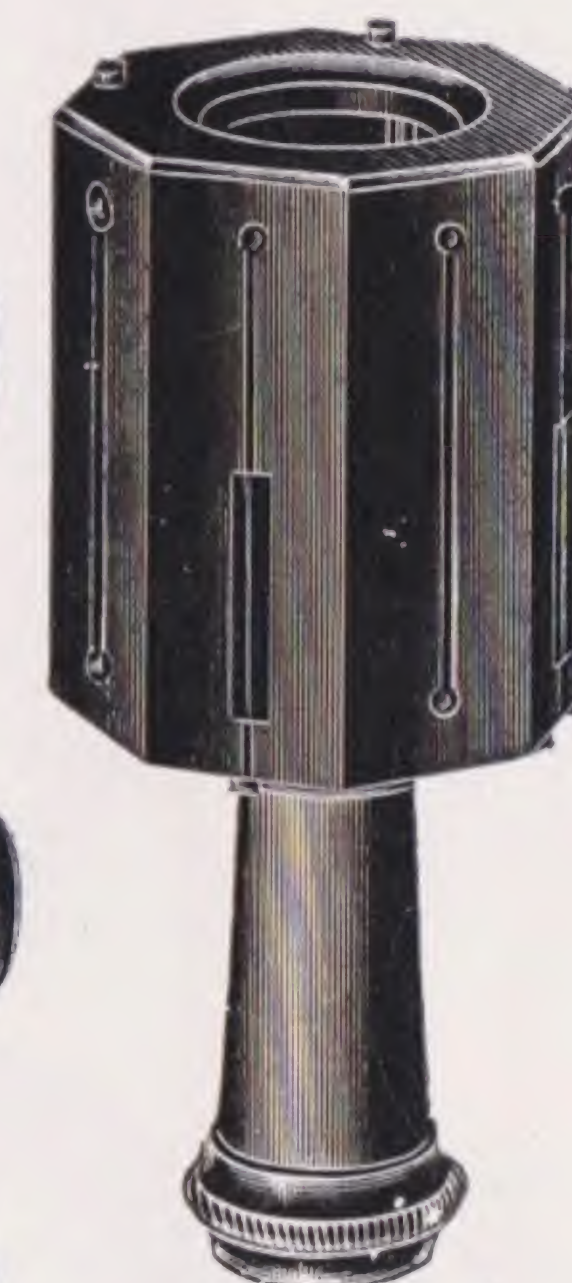
No. 216



No. 219



No. 220

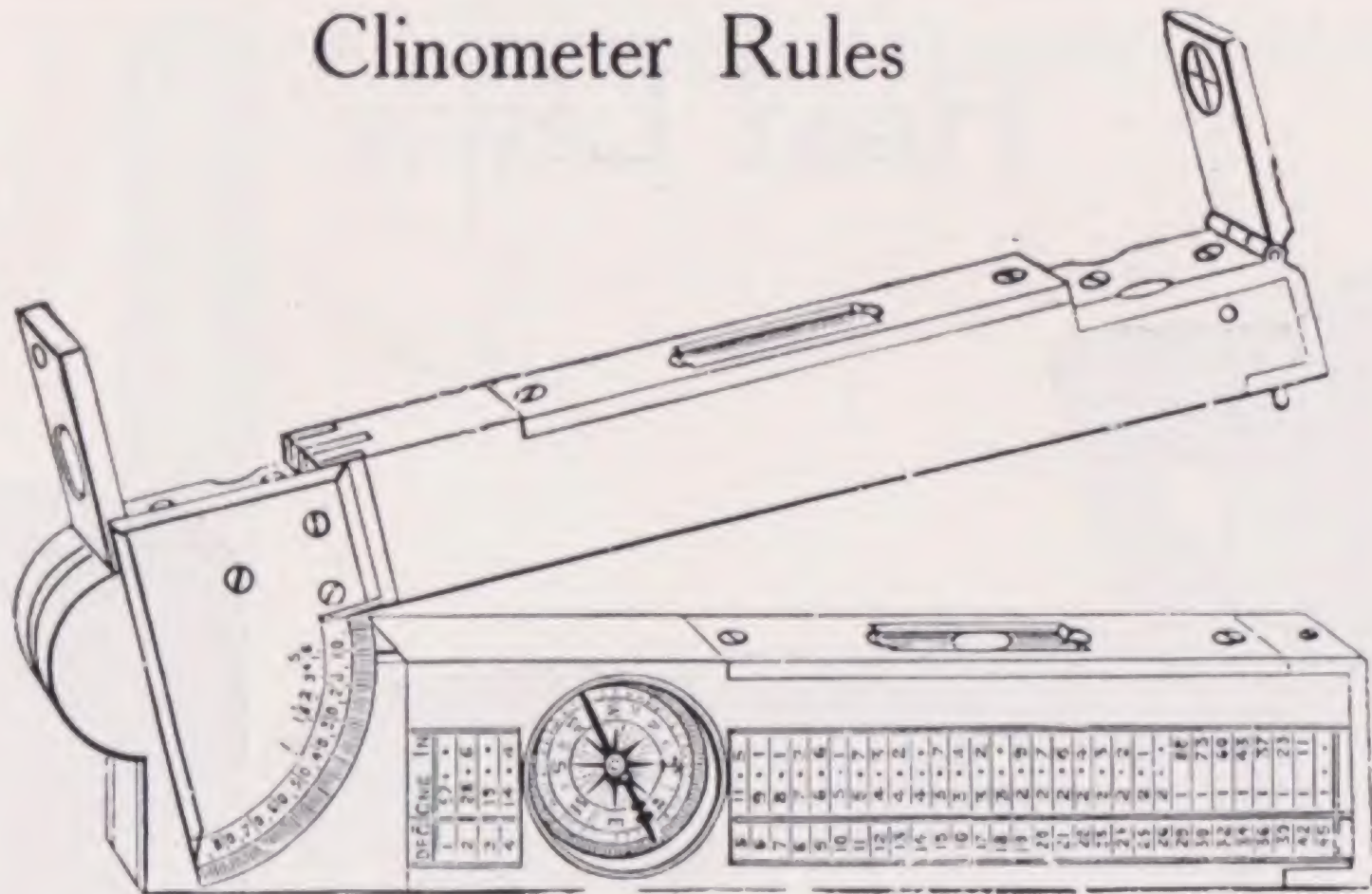


No. 221

- No. 216—Abney Level, 5 in. large arc pattern, with clamp to vernier. Complete, in leather case
- No. 217—Do. do. with magnetic compass
- (A) Magnifying Lens, on movable arm, extra
- No. 218—"Service" Abney Level, 5 in., extra large arc reading to 10 min. magnifier to vernier, double extension telescope
- No. 219—Pocket Reflecting Level (square), in leather case, complete
- No. 220—Do. do. (round)
- No. 221—Octagonal Cross Staff Head, in case
- No. 222—Optical Square, in case with adjustment
- No. 223—Do. do. do. without adjustment

Price	Code Word
£ s. d.	
1 15 0	Image
2 5 0	Immane
0 2 6	
3 10 0	Imbrue
0 10 6	Immask
0 15 0	Immerse
0 7 6	Immerit
1 1 0	Immure
0 15 0	Immerge

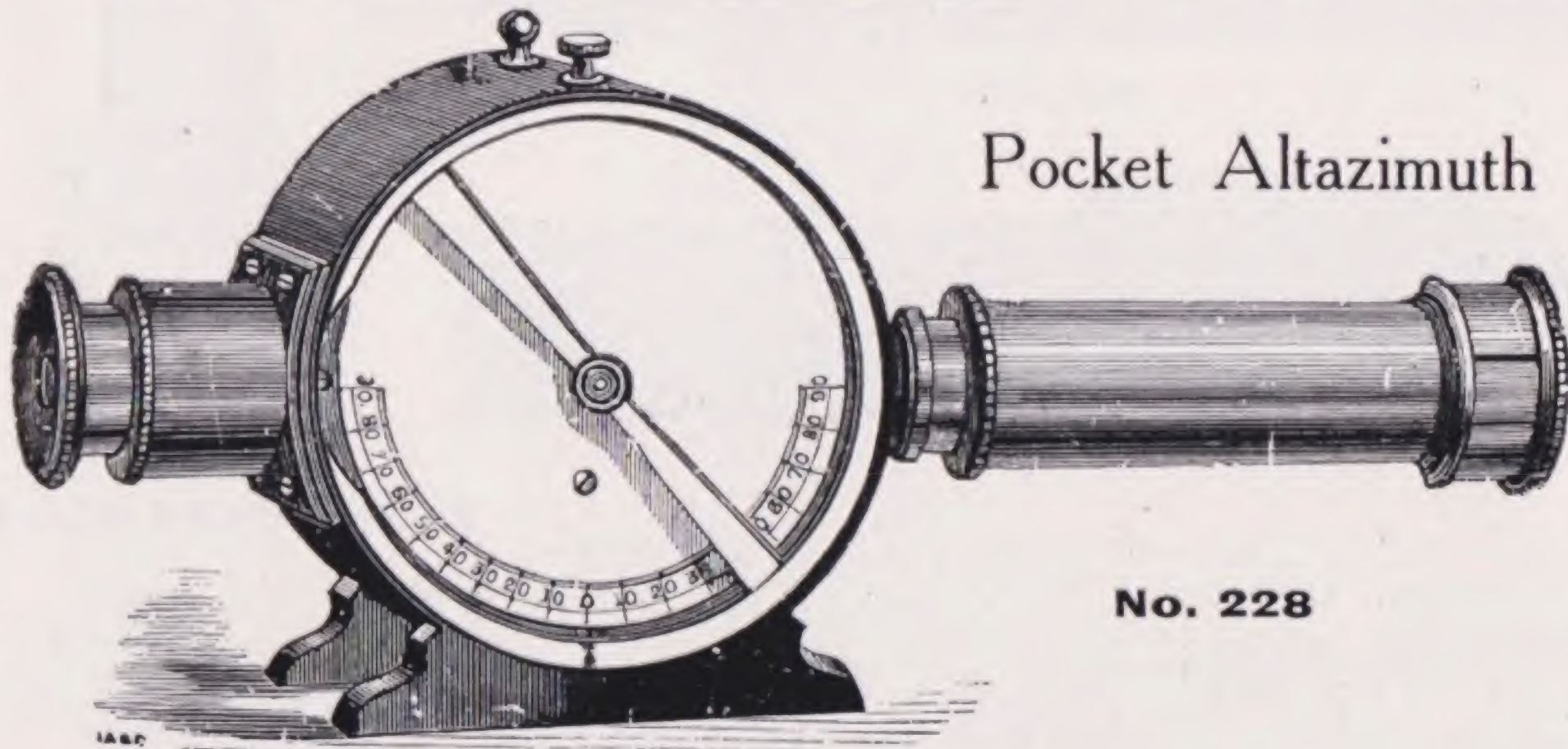
Clinometer Rules



No. 227

- No. 225—Pocket Clinometer, boxwood, brass mounts, with one spirit level, bar needle compass, without sights, in leather case
No. 226—Do. do. with sights and two spirit levels
No. 227—Do. do. best form, with flush vernier, engine divided, two sights, and swing compass, in leather case complete

Price	Code	Word
£ s. d.		
1 1 0	..	Inrail
1 15 0	..	Inspire
2 7 6	..	Inroad



Pocket Altazimuth

No. 228

- No. 228—Pocket Altazimuth. Altitude, azimuth, compass bearings, clinometric degrees, and levels, are all obtainable by this instrument. With best engraved and divided aluminium ring to compass, also divided clinometer circle. Complete with telescope, shade and handle. Size, 6½ in. long, 2½ in. diam. Weight, 13 ozs. In morocco case

£5 10 0	..	Instan
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Miner's Compass or Dipping Needle



No. 230

For locating the presence of magnetic iron ore. Can be used also as an ordinary compass.

	Price	Code	Word
No. 230—Dip Needle Mining Compass in velvet lined case	£1 15 0	..	Jape

Hypsometer or Boiling-point Thermometer

	Price	Code	Word
No. 231—Hypsometrical Apparatus, complete, with one thermometer, in leather sling case	£ s. d. 3 7 6	..	Jar
No. 232—Extra Thermometers for above, in metal case, each	0 12 6	..	Jarar

Standard Mercurial Barometers

	Price	Code	Word
No. 234—Standard Barometer, medium size, divided inches and millimetres, 12.5 mm. bore, on mahogany board	£ s. d. 10 10 0	..	Impact
No. 235—Mountain Barometer, with portable tripod stand and gimbals, in leather sling case ..	9 10 0	..	Impacon

Aneroid Barometers



No. 238



Front View, Nos. 245-248



Back View, Nos. 246 and 248

Specifications

	Price			Code	Word
	£	s.	d.		
No. 238—Surveying Aneroid Barometer, stout bronzed metal case, silvered metal dial, with vernier scale moved by rackwork motion, reading lens arranged to traverse the whole circle; altitude scale, 12,000ft., reading to 2ft., in solid leather sling case, 3in.,	£6	10	0	..	5in.
No. 239—Do. do. but with altitude scale arranged for mining purposes, 4,000ft ascent, 2,000ft. descent, 3in.,	£5	15	0	..	5in.
No. 240—Special Surveying Aneroid, with repeating or second concentric circle of divisions, showing 3,000ft. first circle, 6,000ft. second circle, reading to 1ft...	7	0	0	..	5in.
No. 241—Do. do. showing 5,000 feet first circle, 10,000ft. second circle, reading to 1ft. ...	7	10	0	..	5in.
No. 242—Do. do. showing 8,000ft. first circle, 16,000ft. second circle ...	7	15	0	..	5in.
No. 243—Special Gilt Pocket Aneroid, 2½in., as supplied to the Canadian Government; silvered metal dial, double circle scale reading to 10,000ft. by 100ft., in case of special design ...	5	0	0	..	
No. 244—Pocket Aneroid Barometer, 2½in. diameter, gilt or nickelled, in Morocco snap case, silvered metal dial, with revolving altitude scale, 8,000ft. ...	2	5	0	..	
No. 245—Do. do. 2½in. diameter, silvered metal dial, with raised ring for divisions and curved thermometer, revolving altitude scale reading to 10,000ft., in leather sling case ...	2	12	6	..	
No. 246—Do. do. with large detachable Singer's pearl compass on back ...	3	6	0	..	
No. 247—Watch Form Aneroid, 2in. diameter, gilt or nickelled, silvered metal dial, with raised ring for divisions and curved thermometer, revolving altitude scale reading to 10,000ft., in best snap Morocco case ...	2	6	0	..	
No. 248—Do. do. with large detachable Singer's pearl compass on back ...	3	3	0	..	
No. 249—Watch Form Aneroid, 2in. diameter, silvered metal dial, Hunter form case, revolving altitude scale, reading to 8,000ft. ...	2	5	0	..	
No. 250—Do. do. reading to 10,000ft. ...	2	7	6	..	

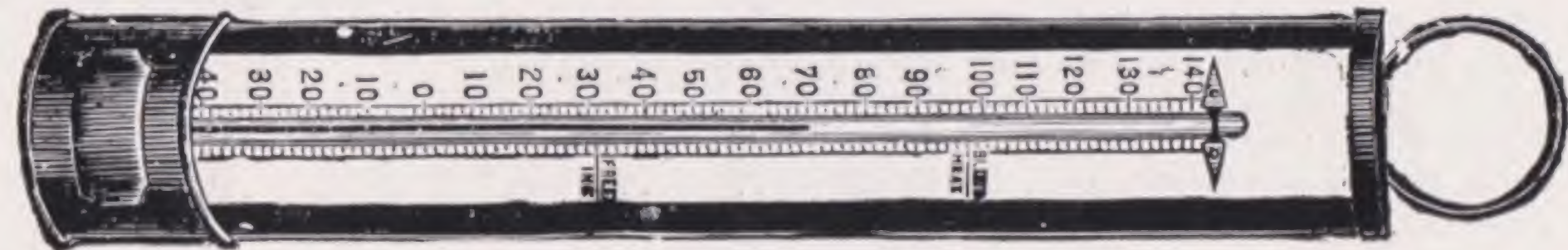
(A) Keyless action to Watch Aneroids, 5/6 each extra.

(B) Any of the above can be supplied to order with metric instead of English scale at the same prices.

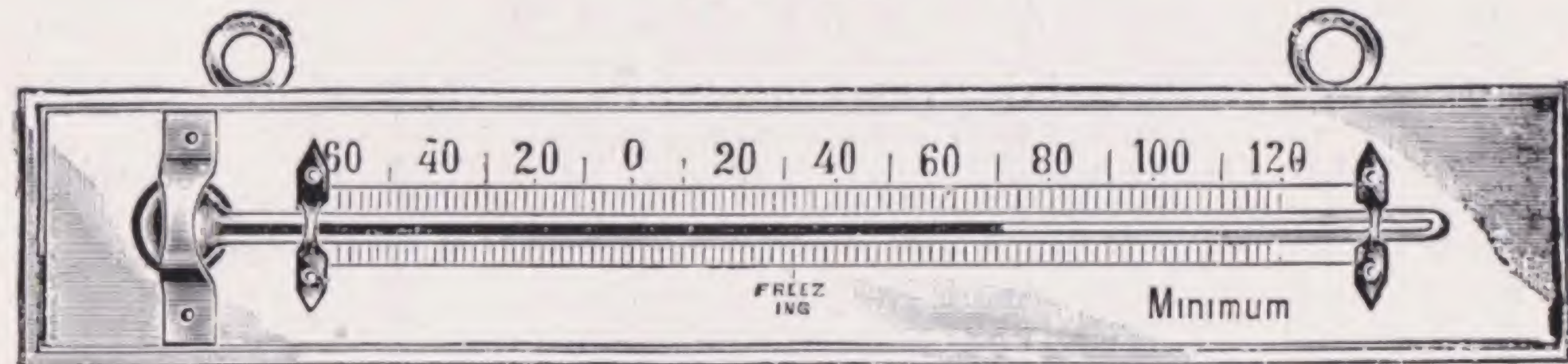
All the above Aneroids are compensated for temperature, and are of the very best quality. Cheaper qualities can be supplied. Prices on application.

Quotations given for all kinds of Aneroid Barometers not included in the above List

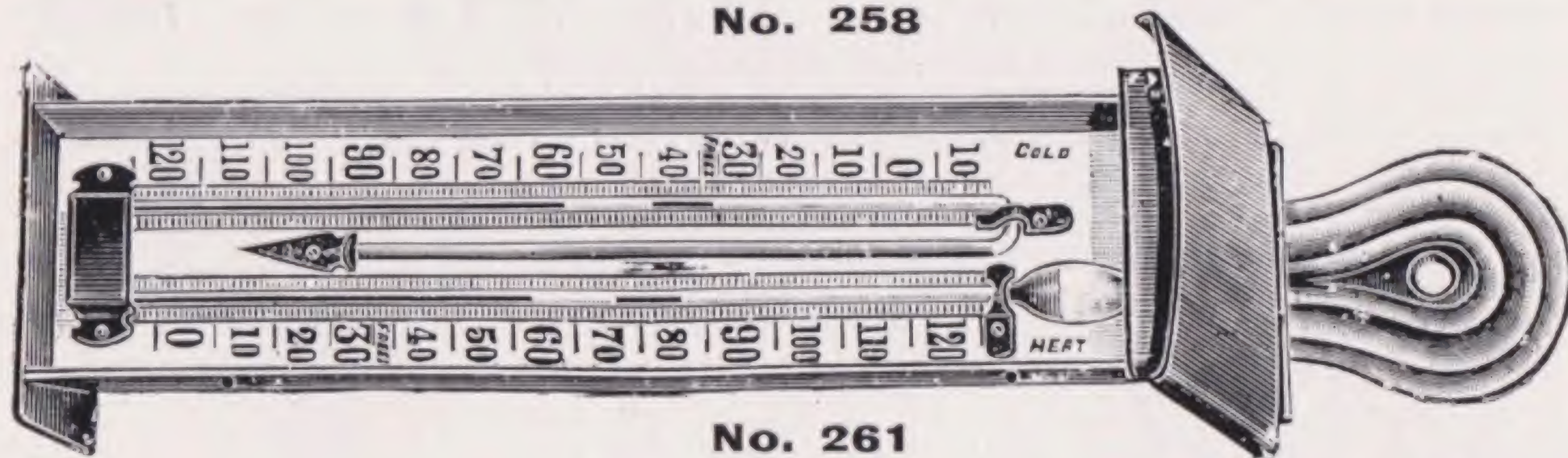
Thermometers



No. 256



No. 258

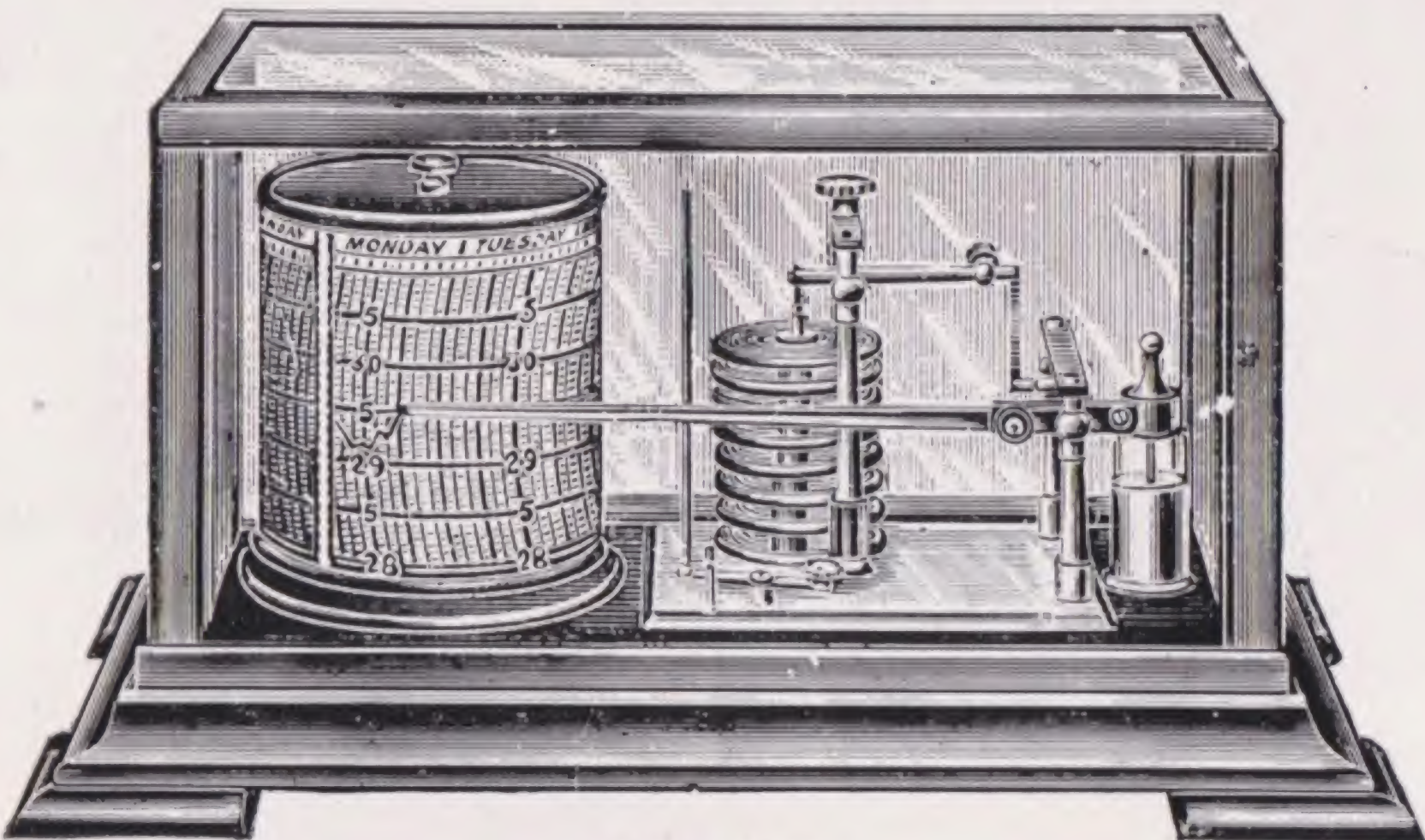


No. 261

	Price	Code Word
No. 255—Distance reading Thermometer, extra large figures, 8in. boxwood scale, reading from 0° to +120° Fahr. . .	2/-	Joefail
No. 256—Thermometer, 8in., medium grade, silvered metal scale, in japanned tin jacket, reading from 0° to +220° . .	2/6	Jerboa
No. 257—Ditto do. in copper jacket	2/9	Jerk
No. 258—Boxwood Minimum Thermometer, 8in. horizontal scale, reading from -60° to +120° Fahr.	1/6	Jerked
No. 259—Best Quality Pocket Thermometer, 6in. boxwood scale, with tube let in below the surface of board, preventing breakage, reading from -60° to +130° Fahr. . .	7/6	Jerker
No. 260—Six's Pattern Maximum and Minimum 8in. Thermometer, metal scale in copper jacket with magnet, best quality, reading from 0° to +120° Fahr.	8/6	Jersey
No. 261—Six's Pattern Maximum and Minimum 10in. Thermometer, with opal scale in japanned metal jacket, with magnet for setting index, best quality, reading from -10° to +120° Fahr.	16/-	Jet
No. 262—Superior High-grade 10in. Thermometer, heavy metal scale, T top, bold tube, rivetted copper case, reading from +30° to 300° Fahr.	10/-	Jetsam

Thermometers can be supplied to any specification to order.

Recording Barometers (Barographs)



No. 266

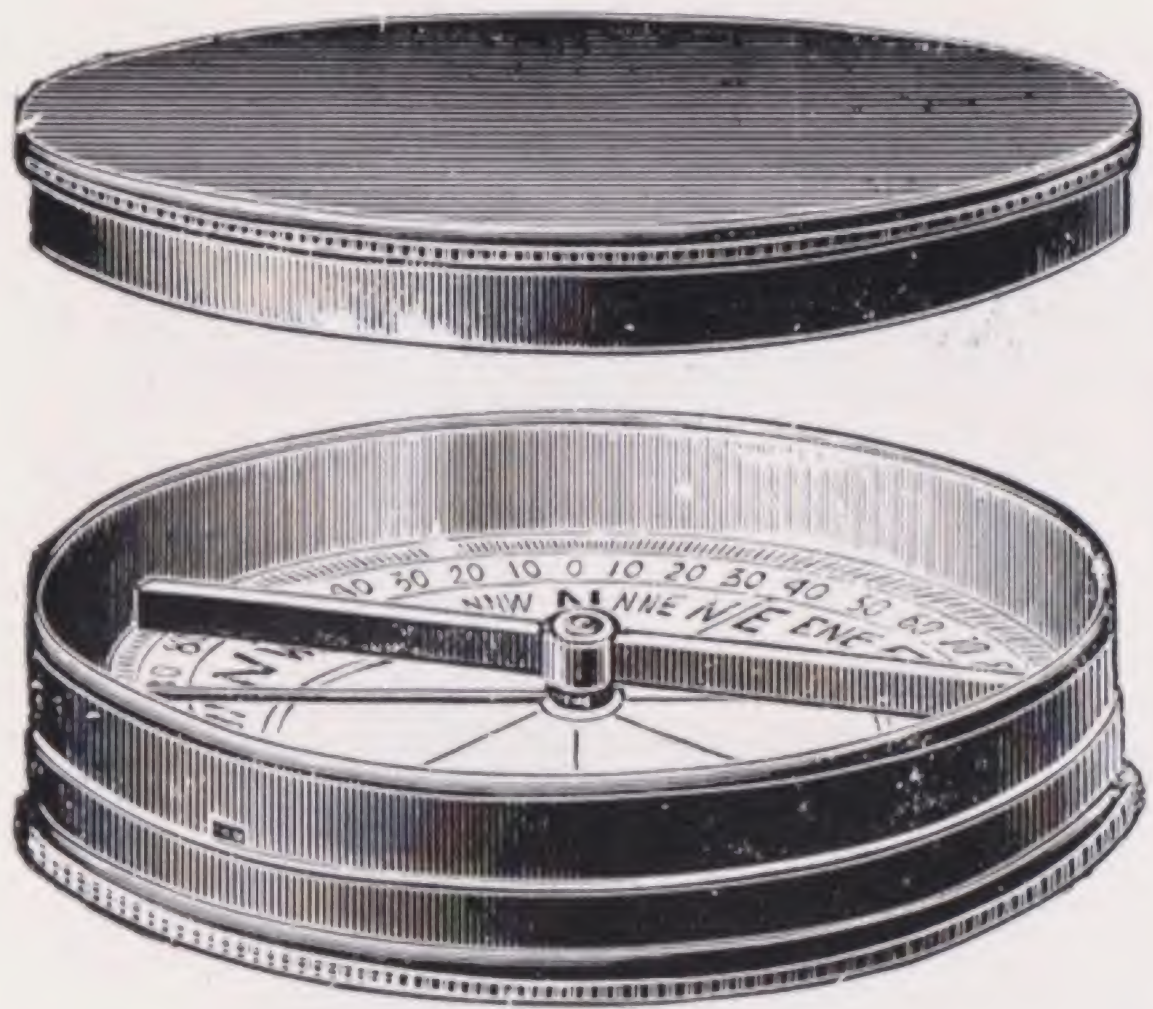
These instruments give a complete record for a week of the atmospheric variations. The exact barometer reading can be seen at any moment, as well as the line traced by the pen for the time preceding. The charts can then be retained as a record for the entire year. All Barographs supplied with bottle of special ink and set of charts for one year.

	Price	Code Word
No. 265—Mahogany case, cover hinged at one end, glass in front and one end, with handle	£ s. d. 5 10 0	Jewel
No. 266—Wood frame, bevelled plate glass cover, in mahogany, oak, walnut, or ebonized	5 15 0	Jeteau
No. 267—Same as No. 265, but with metal case, copper or japanned.	6 0 0	Jettee
(A) Extra sets of charts	0 4 6	—

Recording Thermometers (Thermographs)

	Price	Code Word
No. 270—Metal case, copper or japanned, hinged cover with handle, recording charts from 0° to 100°, or from +20° to 120° Fahr.	£ s. d. 5 17 6	Jingal
No. 271—Ditto do. with extra tall clock drum, recording chart from -20° to +115° Fahr.	6 15 0	Jippo
No. 272—Ditto do. recording chart from -60° to +120° Fahr.	7 0 0	Join
(A) Extra sets of charts for No. 270	0 4 6	—
(B) Ditto do. No. 271 and 272	0 7 0	—

Pocket Compasses



No. 276

No. 276—Pocket Magnetic Compass, best hardened and tempered edge bar needle, with jewel cap and stop, bevelled glass, in stout brass or bronzed box, pull-off cover, with silvered metal dial, 1½ in., 4/6; 2½ in., 6/6 *Indign*

Extra for Nickel-plated Cases to above, 1½ in., 6d.; 2½ in., 9d... .. *Indrench*



No. 277

No. 277—Pocket Magnetic Compass, Hunter Case, secret spring, nickel, gilt, or bronze, silvered metal dial, best hardened and tempered edge bar needle, jewel cap and self-acting stop, 1½ in., 7/6; 2 in., 10/- *Inhold*

No. 278—Do. do. Singer's floating Pearl dial, 1½ in. 10/- 2 in. 15/- *Infract*

No. 279—Pocket Magnetic Compass, square mahogany case with cover. Automatic stop, card dial, divided to degrees. 2 in., 3/6; 3 in., 4/6 *Inept*

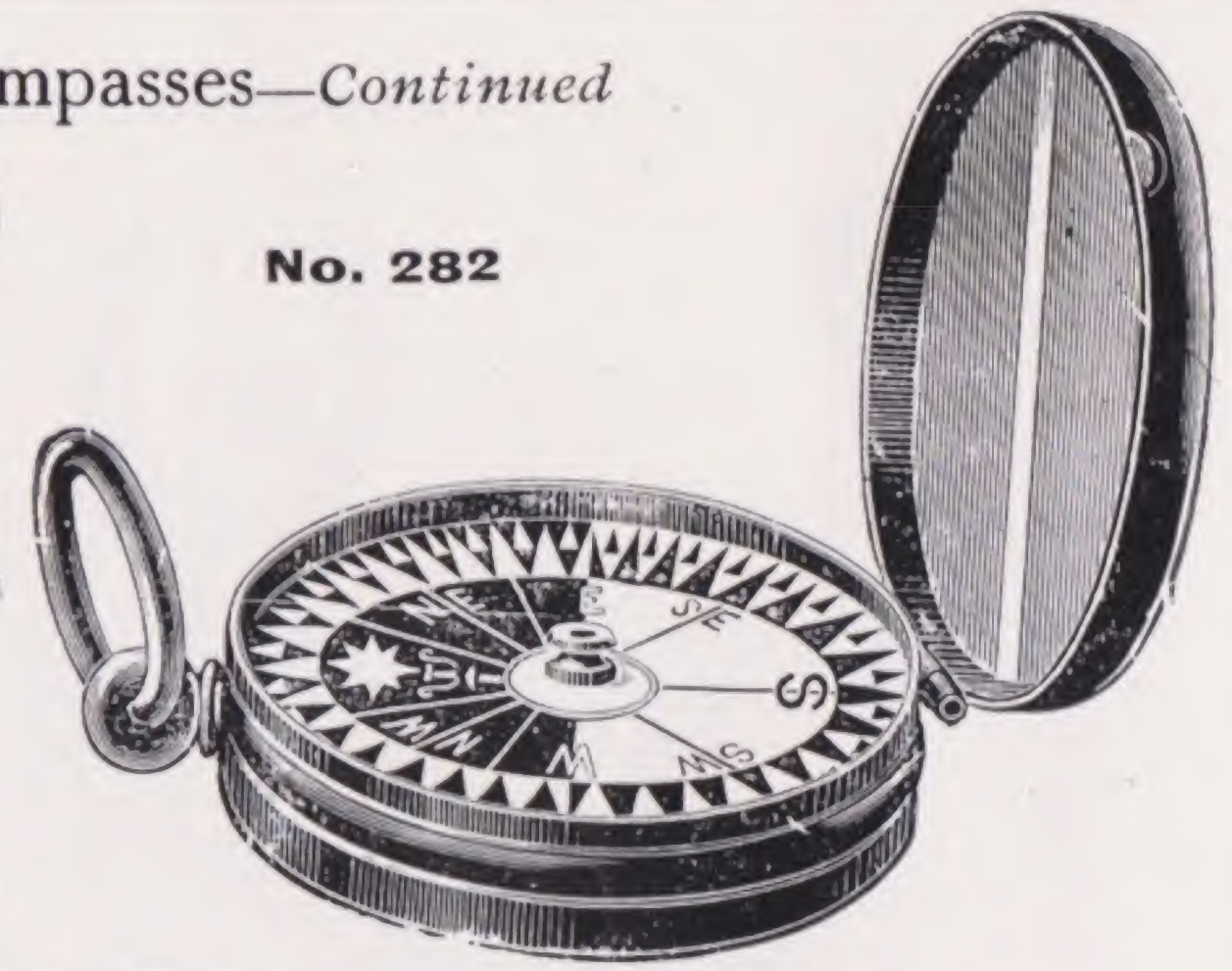
No. 280—Sight Compass, mahogany case, 3 in. x 3 in., needle, automatic stop, graduated raised metal scale, sighting line on inside of cover. U.S. pattern, 12/6 *Inert*

No. 281—Sight Compass, mahogany case, sight in lid and folding sight, card dial, bar needle jewelled, 12/6 *Inate*

Pocket Compasses—Continued

Code Word

No. 282



No. 282—English Military Pattern, strong bronzed metal case, with jointed lid, floating Singer's pattern pearl dial, with luminous points N. & S. and luminous line in lid, 1½ in., 15/-; 2 in., 17/6 *Inustion*

No. 283—Military & Night Marching Compass with graduated Aluminium dial, luminous centre in bronzed case with sight in lid .. 1½ in., £1 0 0 *Inwood*

Portable Air Meters

Code Word



No. 289

No. 288—Portable Air Meter, 2 dials, reading to 1,000ft. .. £2 12 6 *Inserve*

No. 289—Do. 6 dials, reading to 10,000,000 feet £3 3 0 *Insineu*

No. 290—Do. with zero setting adaptations and disconnecter, 2 dials, reading to 1,000 feet .. £2 15 0 *Inseam*

No. 291—Do. with zero setting adaptations and disconnecter, 6 dials, reading to 10,000,000 feet £3 12 6 *Insert*

Quotations given for any description of Anemometer

Anemometers



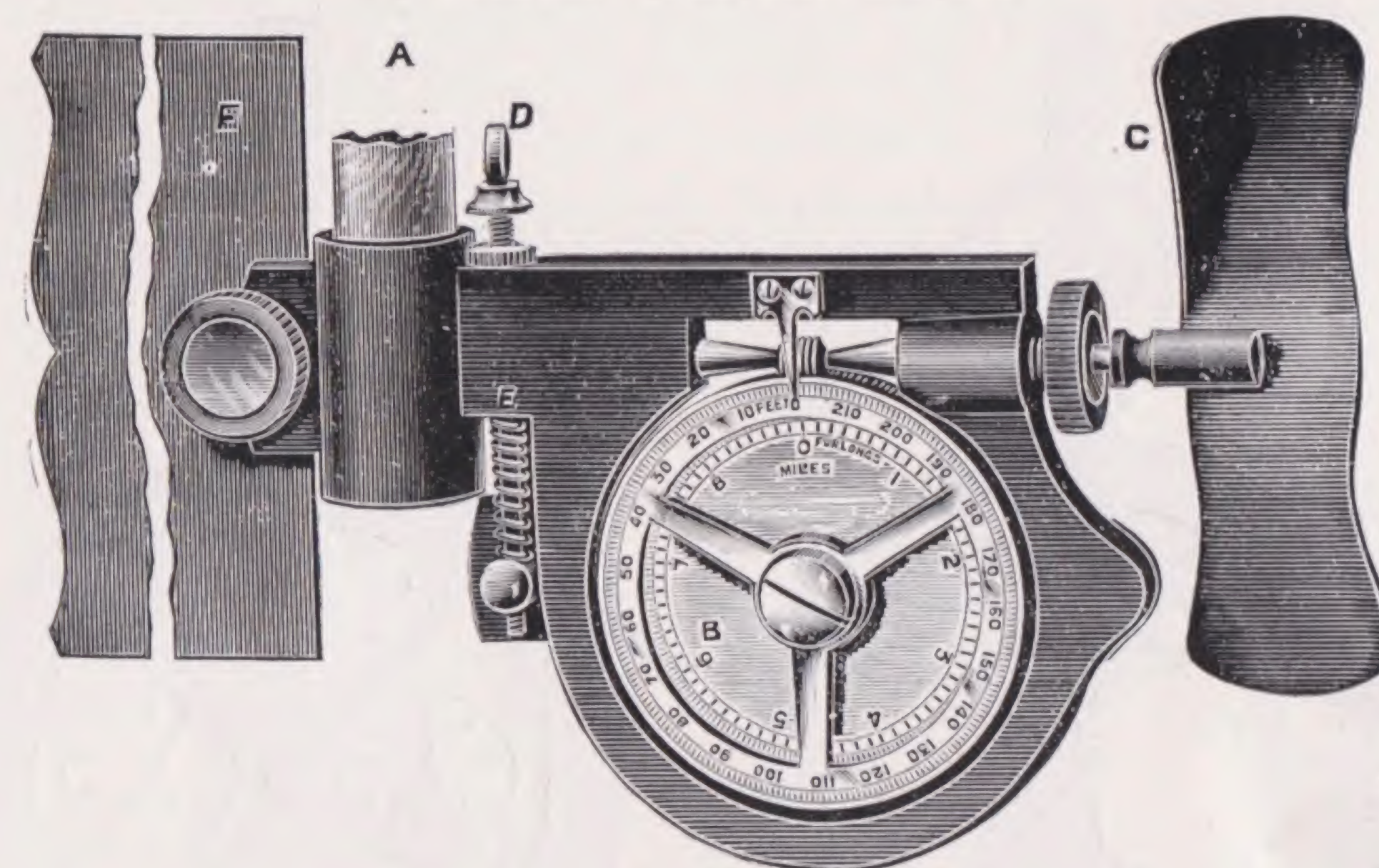
No. 295

	Price	Code	Word
No. 293—Biram's Anemometer, 3in., 2 dials, reading to 1,000ft. with disconnecter, in polished mahogany case ..	£ 2 7 6	..	Insculp
No. 294—Do. do. 4in., 4 dials, reading to 100,000ft. ..	£ 2 15 0	..	Inseaur
No. 295—Do. do. pocket size, 2 dials, reading to 1,000ft. (A) Zero setting arrangement extra	£ 4 0 0	..	Isoth
	£ 0 7 6		

Pocket or Box Sextant

No. 298—Pocket or Box Sextant, graduated on silver to 30 min. reading by vernier to 1 min., with telescope, complete in case	£ 4 2 6	..	Inset
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Portable Current Meter



No. 300

This instrument is constructed and used for the measurement of the rate or flow of small streams and rivers, also for the flow of tides.

The Meter should be placed in the stream, and allowed to run for a given time. The rate of the stream per unit is then shown by reference to the graduations of the circle which are actuated by the force of water upon the fan screws. The value of the graduations are as follows:—

- 1—The inner circle, graduated to show 8 miles in a revolution.
- 2—Each mile, subdivided into 8 parts, showing furlongs.
- 3—Each furlong graduation, subdivided into 3 parts, each equal to 220ft.
- 4—The outer circle, graduated to show single feet, and a complete revolution 220ft.

The circles "B" are attached to movable arms, which throw the endless screw in or out of gear. This arm can be raised by turning the screw which passes through the coil spring "E," which would fix the gearing for constant use. It can also be raised by pulling the cord "D" after the meter is submerged in the stream at the instant of given time, and also released at the expiration of a given time.

The Meter can also be used for determining the quantity of water flowing from a reservoir or tank. For this purpose it is necessary to know exactly the area of the channel or tube through which the water is passing, and in which the Meter must be placed. The volume of water passing per minute in cubic feet can then be ascertained by multiplying the area of tube by the rate per minute shown by the Meter.

	Price	Code	Word
No. 300—Portable Current Meter, complete in mahogany case	£5 10 0	..	Jargon

Levelling Staves

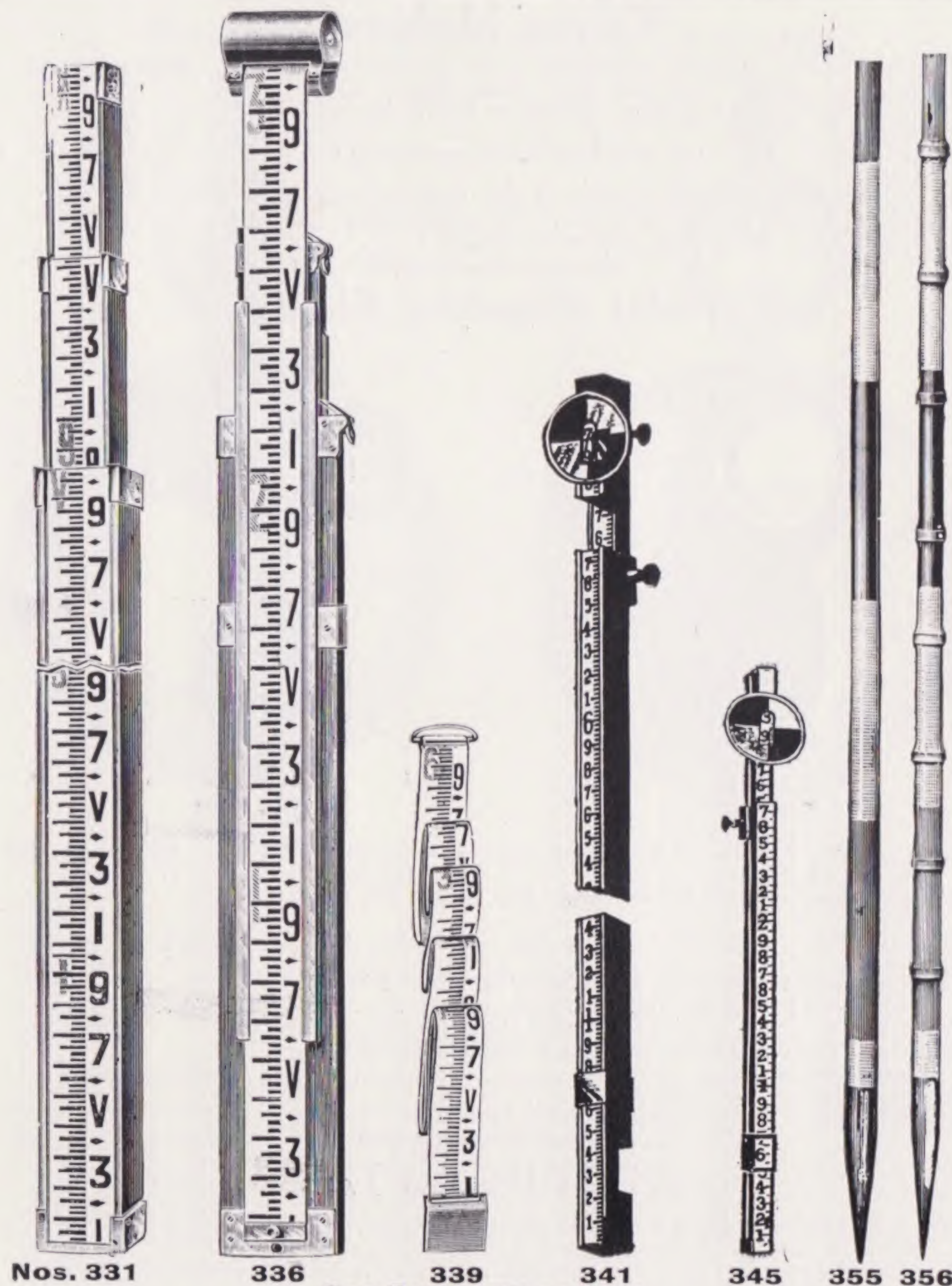
	Price	Code Word
No. 331—Sopwith Telescopic Levelling Staff painted scale with small repeat figures, 14ft.	£ s. d. 2 3 0	.. Junta
No. 332—Ditto do. 16ft. or 5 metres	2 12 6	.. Juntio
No. 333—Ditto do. 18ft.	3 0 0	.. Jupe
No. 334—Canvas Cases for above, 14ft., 10/-; 16ft.	0 12 0	.. Jurat
No. 335—Mining or Sewer Levelling Staff, three length telescopic, for use in confined spaces. Top length reads downwards. 6ft., £1 10 0; 9ft.	1 15 0	.. Julep
No. 336—The "Dwarf" Portable Telescopic Levelling Staff. This staff is of new design, and is particularly suitable for use in confined situations. The reading is on a flexible waterproof tape, which is opened on a spring, and is entirely protected when not in use. The staff is constructed on a sliding principle, and is automatically locked at any height. Made in polished ash, with brass fittings. Weight of 6ft. staff, 3lbs. Length when closed, 31½in. Opening to 6ft. or 2 metres long..	2 2 6	.. Justness
No. 337—Ditto do. 8ft. long	2 12 6	.. Justle
No. 338—Flexible or Pocket Levelling Tape. 10ft. long, divided into 10ths and 100ths.	0 9 6	.. Kali
No. 339—Rubber Cloth Levelling Tape, with foot plate and hand ring, 6ft. long	0 9 6	.. Kayle

American Pattern Staves

	Price	Code Word
No. 341—Philadelphia Rod, hardwood, divided into feet and 10ths, vernier reading to 100ths, with target vernier and clamp. 7ft. sliding to 13ft.	£ s. d. 2 10 0	.. Jus
No. 342—Philadelphia Rod, similar to above, but divided into feet, 10ths and 100ths, vernier reading to 1,000ths .	2 15 0	.. Justed
No. 343—Light Philadelphia Rod, same as No. 341, but 6½ft. sliding to 12ft.	2 7 6	.. Justice
No. 344—Ditto do. second quality	2 0 0	.. Justify
No. 345—Mining Rod, hardwood, divided into feet, 10ths, vernier reading to 100ths, target vernier and clamp. Length, 3ft. sliding to 5ft.	2 2 6	.. Justing
No. 346—Mining Rod, as No. 345, but 5ft. long sliding to 9ft.	2 7 6	.. Justly
No. 347—Chicago Levelling Rod, 12½ft. long, in cloth case with three pockets. This rod is made by joining three pieces of thoroughly seasoned wood, by means of nickel-plated sockets, so constructed as not to obscure the face of the rod	1 10 0	.. Jut

Most of the Levelling Staves listed above can be supplied with Metrical readings, if preferred, and are made in a variety of patterns in either feet or metres.

For illustrations see page 66.



See Pages 67 and 68

Levelling Staff Accessories

	Price	Code Word
No. 351—Spirit Level for the back of Staff, to show if held vertical ; when not in use folds up flush with the back of Staff ..	7/6	Keeler
No. 352—Staff Protectors for strapping Instrument Tripod to face of Staff for protecting the markings and convenience in carrying per pair	3/6	Keelage
No. 353—Triangular Metal Plate, with chain and ring on which to place staff	2/6	Keeled

Ranging Poles, Off-sets, Boning Rods, &c.

	Price £ s. d.	Code Word
No. 355— Ranging Poles or Pickets , round or hexagon, painted in three colours, fitted with specially made wrought-steel shoes of light construction, and very strong. Per dozen: 6ft. £1 8 6; 8ft. £1 19 0 10ft.	2 12 6	Keckle
No. 356—Bamboo Ranging Poles, plugged both ends and fitted with steel shoe and ferrule at top. Per dozen: 6ft. £1 14 0; 8ft. £2 5 0 10ft.	2 17 6	Keeve
For illustration, see page 66.		
No. 357—Off-set Rods, 10-link, 3/- each; with hook for chain, each	0 4 6	Kelp
No. 358—Boning Rods, common per set	0 12 0	Kemp
No. 359—Flags, per dozen: 6/-, 9/-, and	0 12 0	Ken

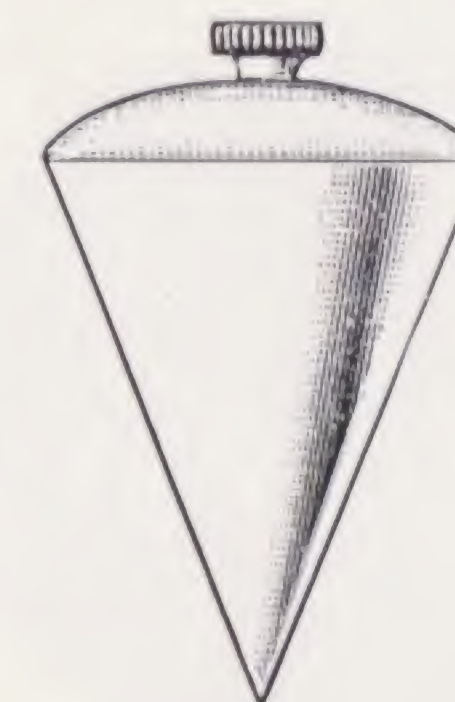
Tropical Umbrellas

	Price	Code Word
No. 361—Tropical Umbrella, lined, large size, jointed extension, with iron shoe, top jointed, allowing it to be set at any angle	1 15 0	Kerf
No. 362—Do. smaller size, cheaper quality	0 12 6	Kermes

Plumb Bobs



No. 365



No. 369



No. 374



No. 370

No. 365—Mercury Plumb Bobs	3½ oz., 4 in. × ½ in.	..	5/-
No. 366— „ „	6 oz., 4½ in. × ½ in.	..	7/6
No. 367— „ „	12 oz., 5½ in. × ½ in.	..	10/6
No. 368— „ „	16 oz., 6 in. × 1 in.	..	12/6
No. 369—Chainman's Plumb Bob	6 oz. .. ..	..	3/6
No. 370—Gun-metal Plumb Bob, steel point, screw cap	4 oz. 4/- .. 8 oz. 6/6 .. 12 oz. 7/6	..	10 oz. 15/-
No. 371—Adjustable Plumb Bob, with concealed reel .. .. .	.. .. .	..	10 oz. 15/-

Plumb Bob Cord

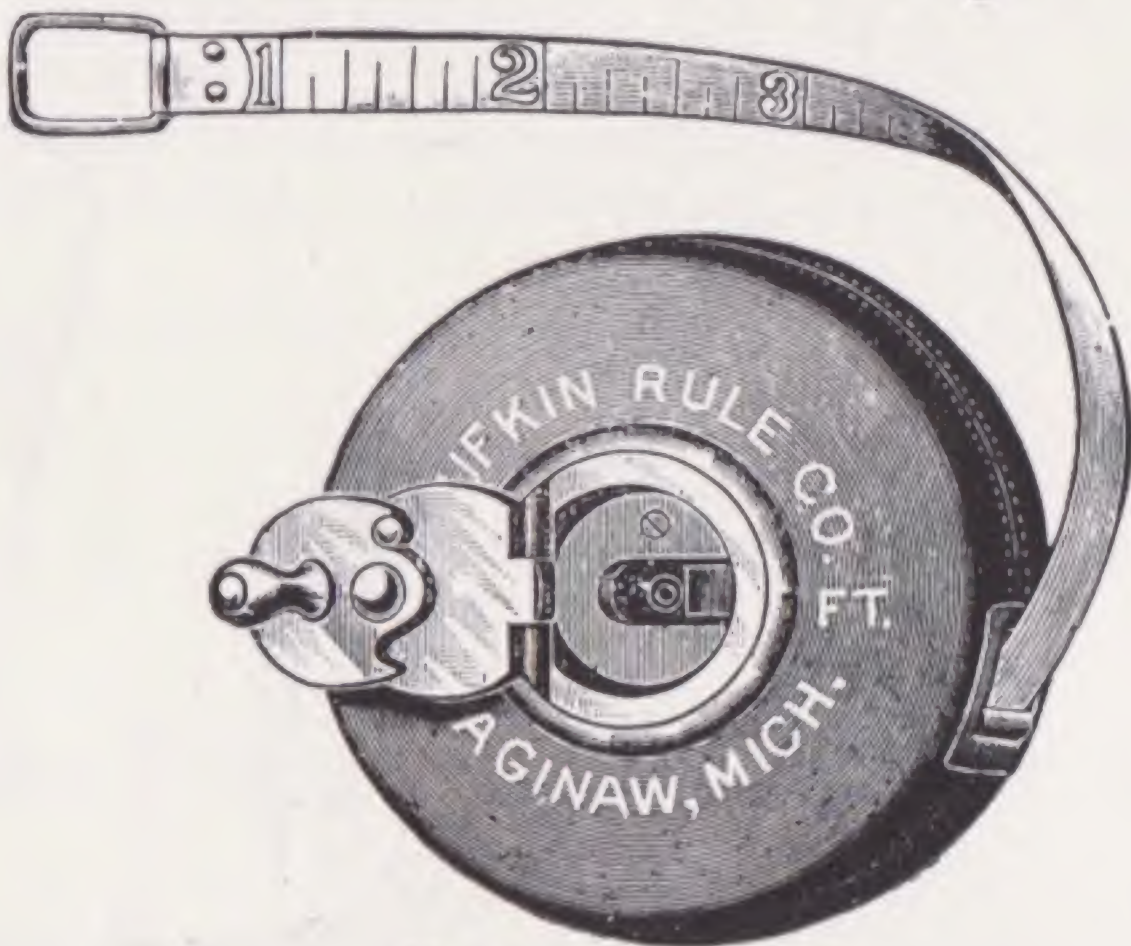
No. 372—Plumb Bob Cord, thick, medium, or thin per doz. yards	6d.
No. 373— „ „ plaited silk „ „	1/-

Stake Tacks

No. 374—Galvanized Stake Tacks, with recess in head on which to accurately centre a plumb bob 50 in box	6d.	..	100 in box	1/-
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Surveyors' Tapes, Chains, &c.

"Reliable" Steel Tapes



Nos. 381-383

Tape 3/8 in. wide, fitted into hard leather case, patent double folding flush handle nickel-plated trimmings.

Marked Ft. and 12ths (inches and eighths)	Marked Ft., 10ths, and 100ths of Ft.	Length	Diam. of case	Price	Code Word
No. 381 (203)	No. 381D (203)	50ft.	3 1/4 in.	17/6	Knar
No. 382 (204)	No. 382D (204)	66ft.	3 3/4 in.	21/-	Kneed
No. 383 (206)	No. 383D (206)	100ft.	4 1/2 in.	30/-	Kneel

The above Tapes are marked on the back with links and poles. When links are not wanted they will be supplied marked at every foot instead, at the same price.

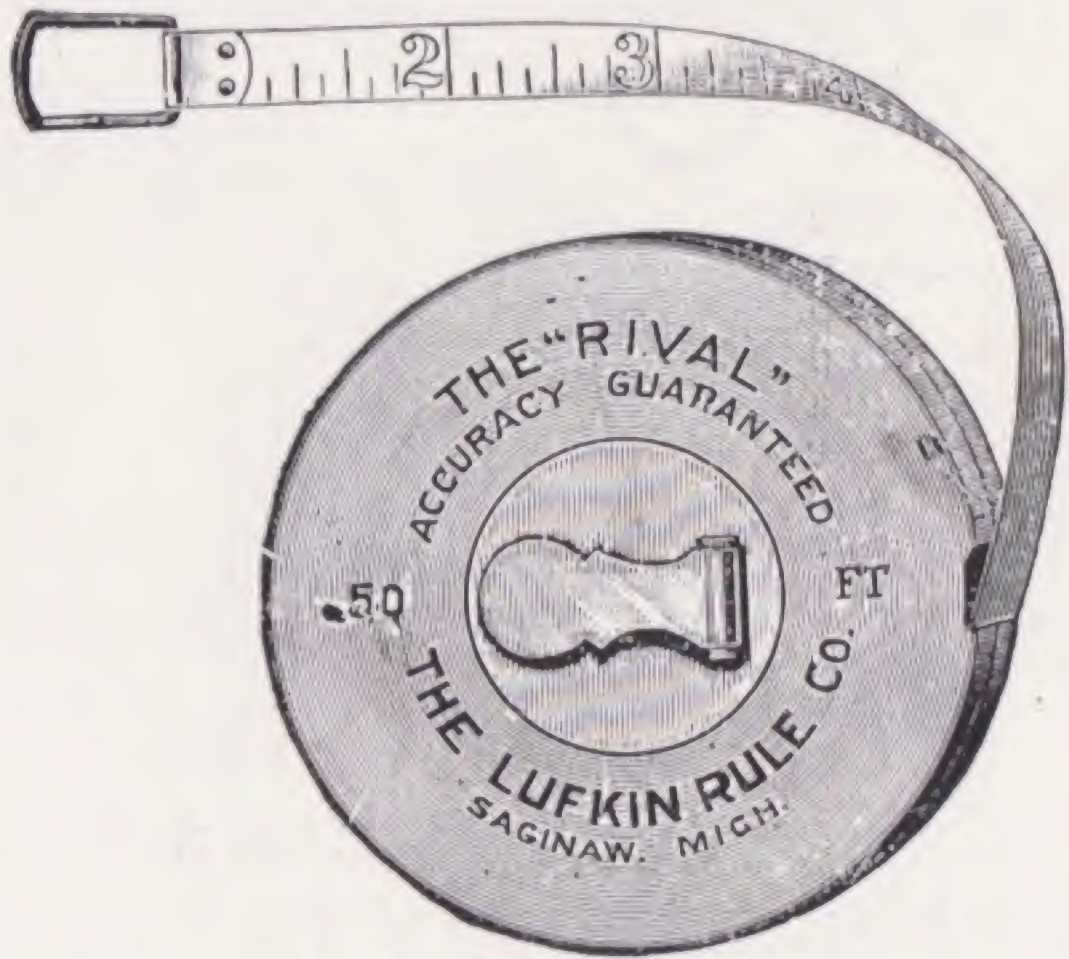
"Reliable" Steel Tapes, with instantaneous reading

These Tapes have a repetition of the foot figures marked before every inch or tenth of a foot (as the case may be), absolutely preventing any misreading of the tape. The following illustration will show the markings.



The above instantaneous readings furnished on any regular 3/8 in. "Reliable" tape from 25ft. to 100ft., when specified.

"Rival" Steel Tapes



Nos. 385-388

Marked on one side only, in tenths or twelfths. 3/8 in. tape.
Nickel-plated Steel Case, with flush handle.

Marked Ft. and 12ths (inches and eighths.)	Marked Ft., 10ths, and 100ths of Ft.	Length	Diam. of Case	Price	Code Word
No. 385 (240)	No. 385D (240)	25ft.	2 3/4 in.	7/9	Knight
No. 386 (243)	No. 386D (243)	50ft.	3 1/4 in.	10/-	Knit
No. 387 (244)	No. 387D (244)	66ft.	3 3/4 in.	12/6	Knob
No. 388 (246)	No. 388D (246)	100ft.	4 1/4 in.	16/6	Knock

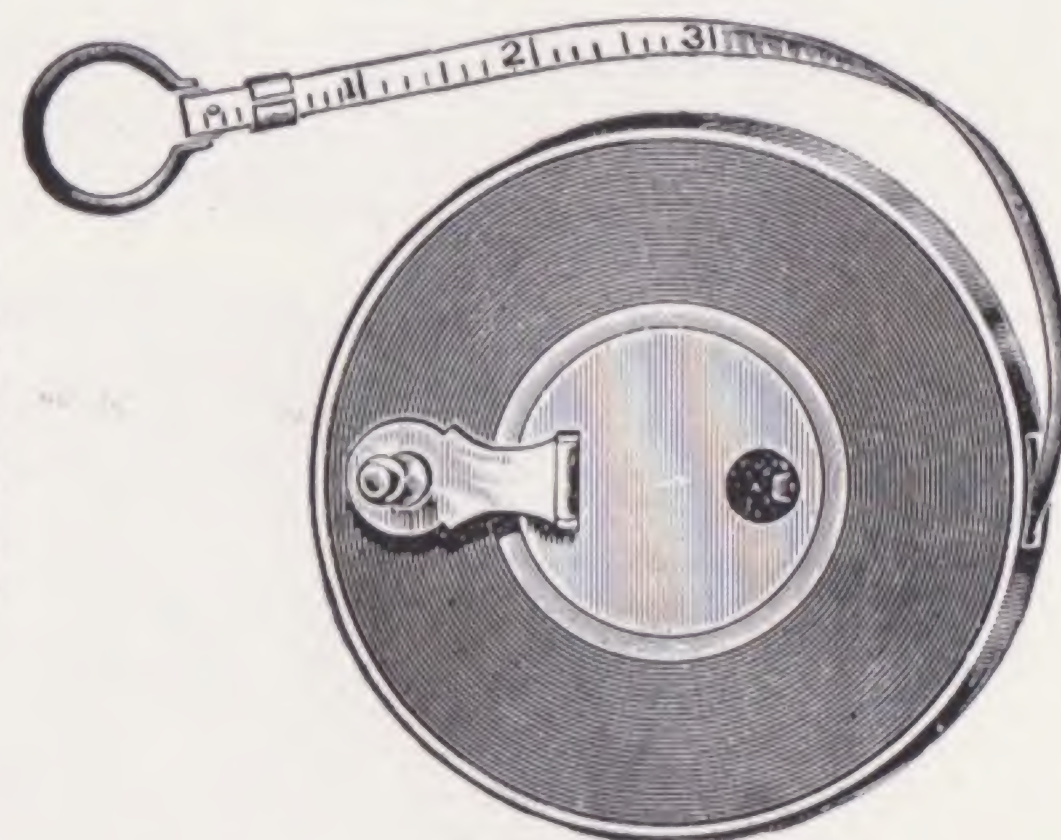
"Rival Junior" Steel Measuring Tapes

Nickel-plated Steel Case, flush folding handle.

Marked Ft. and 12ths (inches and 16ths)	Marked Ft., 10ths, and 100ths of Ft.	Length	Diam. of Case	Price	Code Word
No. 389 (1240)	No. 389D (1240)	25ft.	2 1/4 in.	7/3	Knoll
No. 390 (1243)	No. 390D (1243)	50ft.	2 3/4 in.	9/-	Knop
No. 391 (1246)	No. 391D (1246)	100ft.	3 3/8 in.	15/-	Knot

Engineer's Pattern Steel Tapes

Tape $\frac{1}{2}$ in. wide, in hard leather case. Nickel-plated trimmings, two detachable rings. The Tape may be readily detached from the frame, and an extra ring is supplied for the other end. Very strong Tapes and thin cases. Marked on one side.

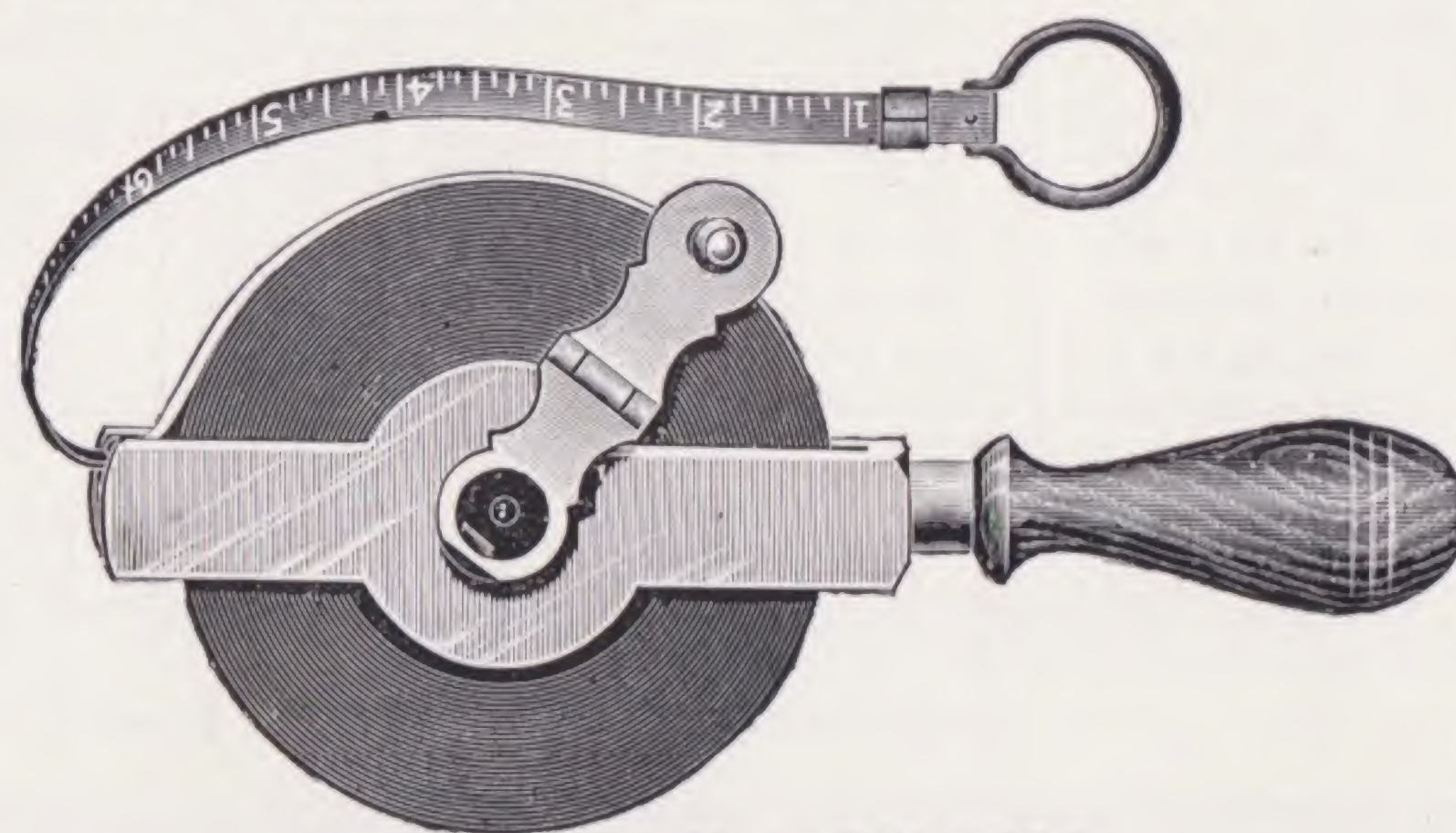


Nos. 393-394

Marked Ft. and 12ths (inches and eighths)	Marked Ft., 10ths and 100ths of Ft.	Length	Diam. of Case	Price	Code Word
No. 393 (233)	No. 393D (233)	50ft.	4 $\frac{1}{4}$ in.	17/6	Known
No. 394 (236)	No. 394D (236)	100ft.	5 $\frac{1}{4}$ in.	34/-	Koba

Engineer's Pattern Frame Steel Tapes

Tape $\frac{1}{2}$ in. wide, fitted into nickel-plated brass frame with folding winding handle. Two detachable rings. Frame can be easily carried in the pocket, when tapes are detached for use. Marked one side in tenths or twelfths.

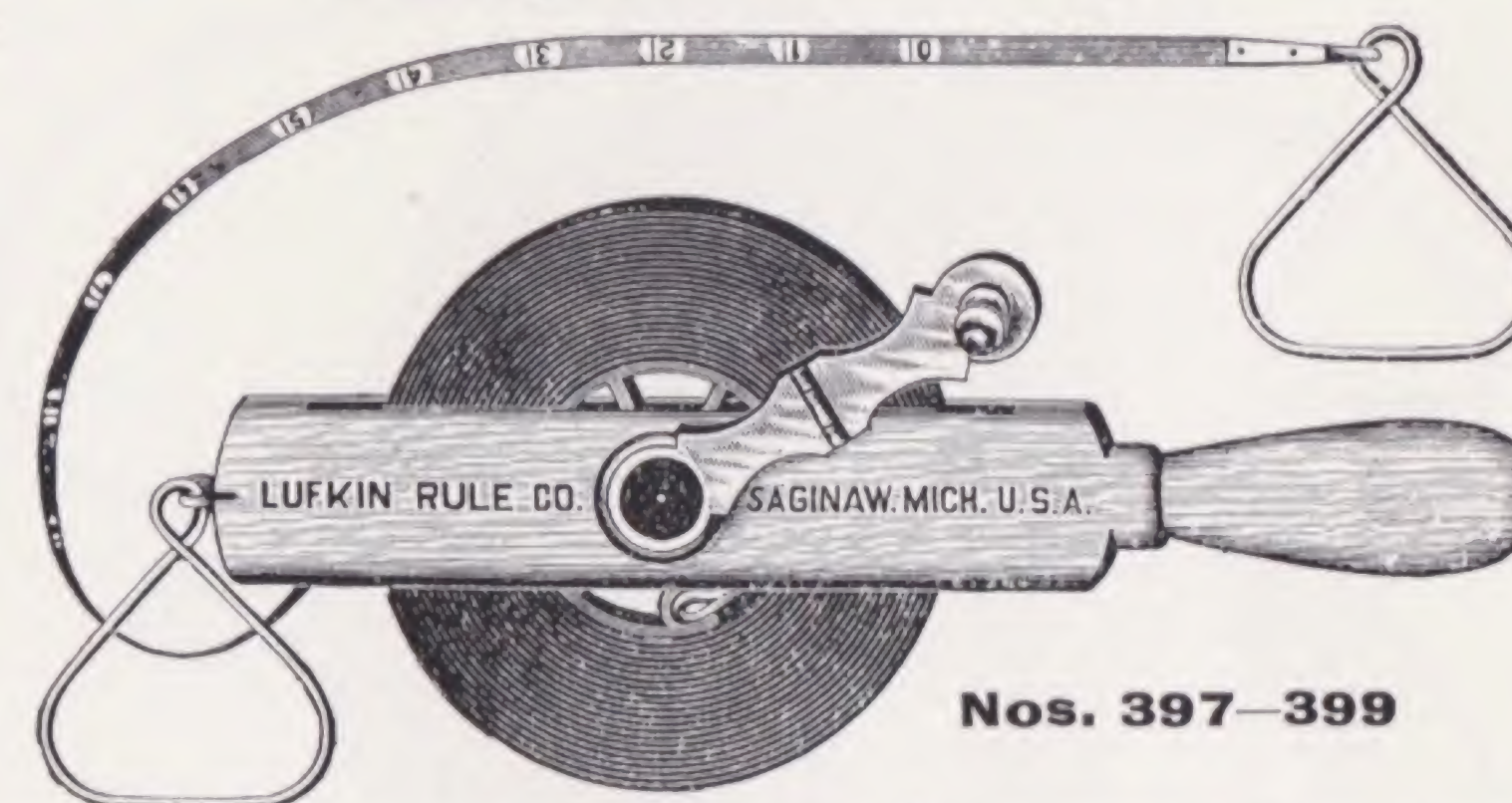


Nos. 395-396

Marked Ft. and 12ths (inches and eighths)	Marked Ft., 10ths, and 100ths of Ft.	Length	Price	Code Word
No. 395 (274)	No. 395D (274)	66ft.	18/-	Konob
No. 396 (276)	No. 396D (276)	100ft.	25/6	Kopeck

Tapes 100 feet and longer supplied with 4-arm frame.

Surveyors' Chain Tapes

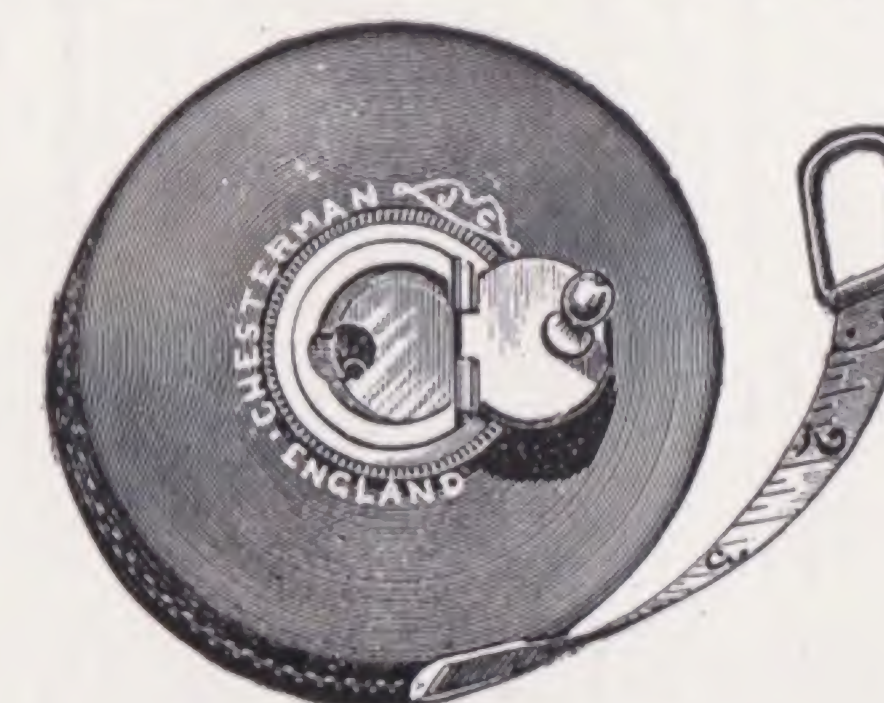


Nos. 397-399

$\frac{1}{2}$ in. steel tape, well finished hardwood reel, large metal folding handle and two rings, nickel-plated trimmings. The frame can be carried in the pocket when tape is in use. Two large detachable handles are provided for tape, which also serve to carry the complete tape.

Tapes complete with reels			Tapes only		
	Price	Code Word		Price	Code Word
No. 397 (5,100), 100ft.	17/-	Kufic	With two rings ..	11/6	Label
No. 398 (5,200), 200ft.	25/6	Kurie	" " ..	20/-	Labent
No. 399 (5,066), 100 links	14/6	Kyrie	" " ..	8/6	Labial

Chesterman's Steel Tapes

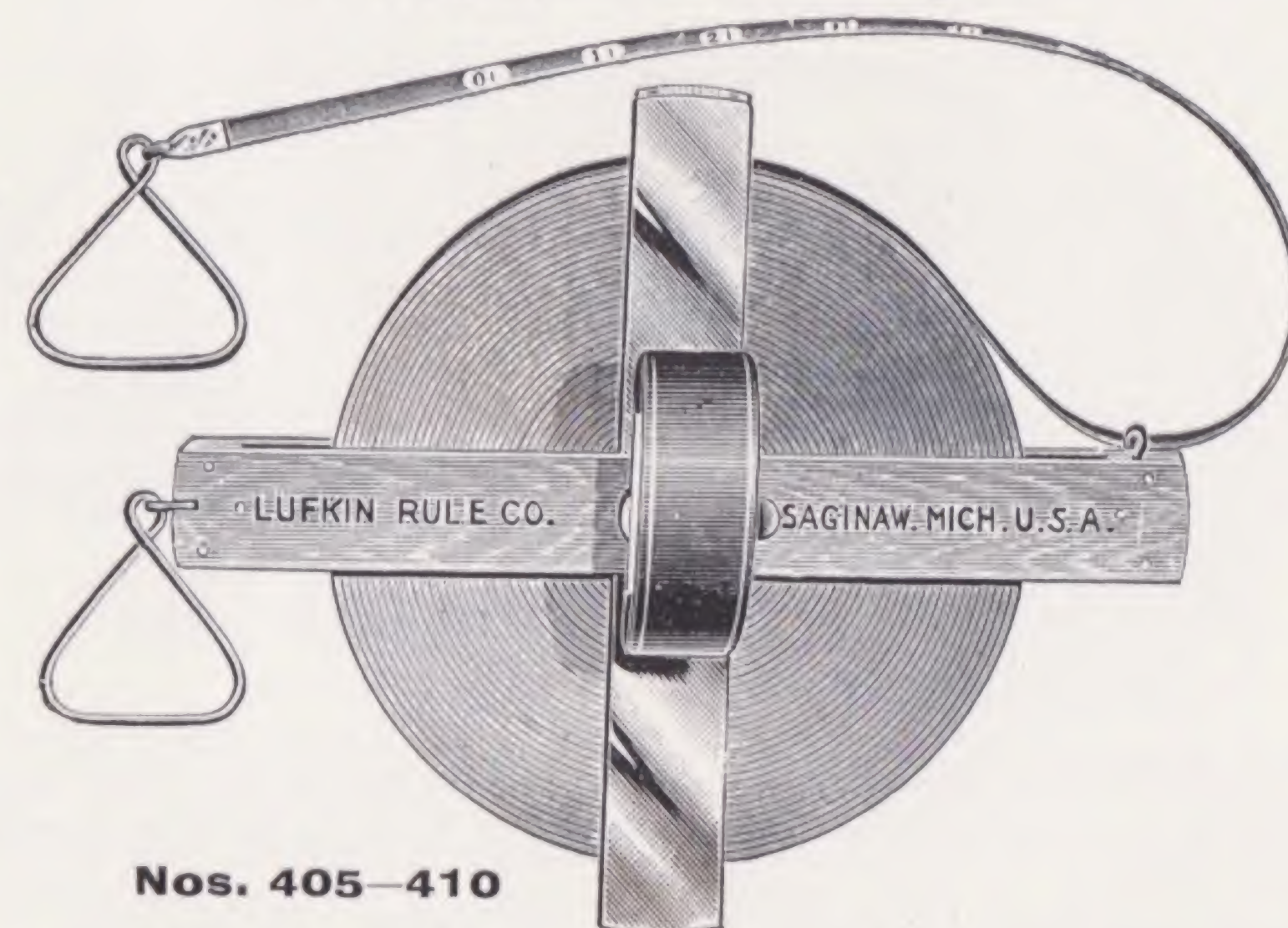


Nos. 401-403

Tape $\frac{3}{4}$ in. wide, marked into feet, inches and eighths one side, links, &c., on the other. Fitted into solid leather case with patent flush handle.

	Price	Code Word
No. 401 (38L)—Length 25ft... ..	10/-	Labor
No. 402 (38L)—" 50ft... ..	15/-	Labrose
No. 403 (38L)—" 100ft... ..	26/-	Laccio

Surveyors' Chain Tapes



Nos. 405-410

$\frac{3}{8}$ in. Tape. This tape is fitted into a folding reel with steel cross arms, which keeps the tape in place when winding or unwinding. The reel, when tape is removed, folds up small enough to conveniently go into the pocket.

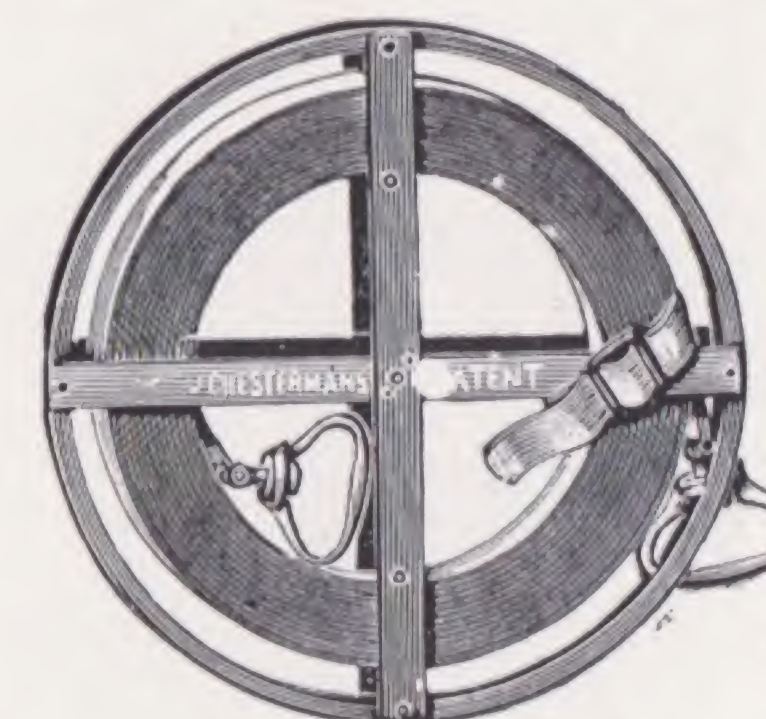
Tapes complete with reel			Tapes only		
	Price	Code Word		Price	Code Word
	£ s. d.			£ s. d.	
No. 405 (6,100)—100ft...	1 1 6	.. Lace..	..	0 12 0	.. Lacked
No. 406 (6,200)—200ft...	1 10 0	.. Laced	..	1 0 0	.. Lackey
No. 407 (6,300)—300ft...	2 0 0	.. Lactera	..	1 10 0	.. Lacking
No. 408 (6,066)—100 links	0 18 3	.. Lache	..	0 9 0	.. Laconic
No. 409 (6,198)—300 links	1 10 0	.. Lacing	..	1 0 0	.. Lacquis
No. 410 (6,330)—500 links	2 5 0	.. Lack	..	2 0 0	.. Lactary

The "Chicago" Steel Tapes

We recommend this tape as being one of the strongest tapes made. It is guaranteed not to break under almost any conditions. Plainly marked and numbered at every foot or link, end foot in tenths.

	Without reel	On metal reel	On wooden reel	
	Price	Price	Price	Code Word
	£ s. d.	£ s. d.	£ s. d.	
No. 412—100ft.	0 14 0	0 18 9	0 17 0	.. Lactate
No. 413—200ft.	1 2 6	1 14 0	1 5 6	.. Lacteal
No. 414—300ft.	1 10 0	2 6 0	1 16 0	.. Lactic
No. 415—100 links	0 11 6	0 15 9	0 14 0	.. Lacuna
No. 416—200 links	0 19 0	1 6 6	1 2 0	.. Ladder

Chesterman's Steel Band Chains on Reels



Nos. 418-423

Blued Steel Band Chain, divided by brass studs at every link, and numbered at every ten links, the first and last link into 10ths.

	Price	Code Word
No. 418—4 poles long, $\frac{1}{2}$ in. wide	13/6	.. Lade
No. 419—4 poles long, $\frac{3}{8}$ in. wide	18/-	.. Laded

Divided by brass studs at every foot, numbered at every ten feet, the first and last foot into 10ths or 12ths.

No. 420—50 feet long, $\frac{1}{2}$ in. wide	9/6	.. Laden
No. 421—100 feet long, $\frac{1}{2}$ in. wide	16/-	.. Lading
No. 422—50 feet long, $\frac{3}{8}$ in. wide	13/-	.. Ladle
No. 423—100 feet long, $\frac{3}{8}$ in. wide	22/-	.. Lafette

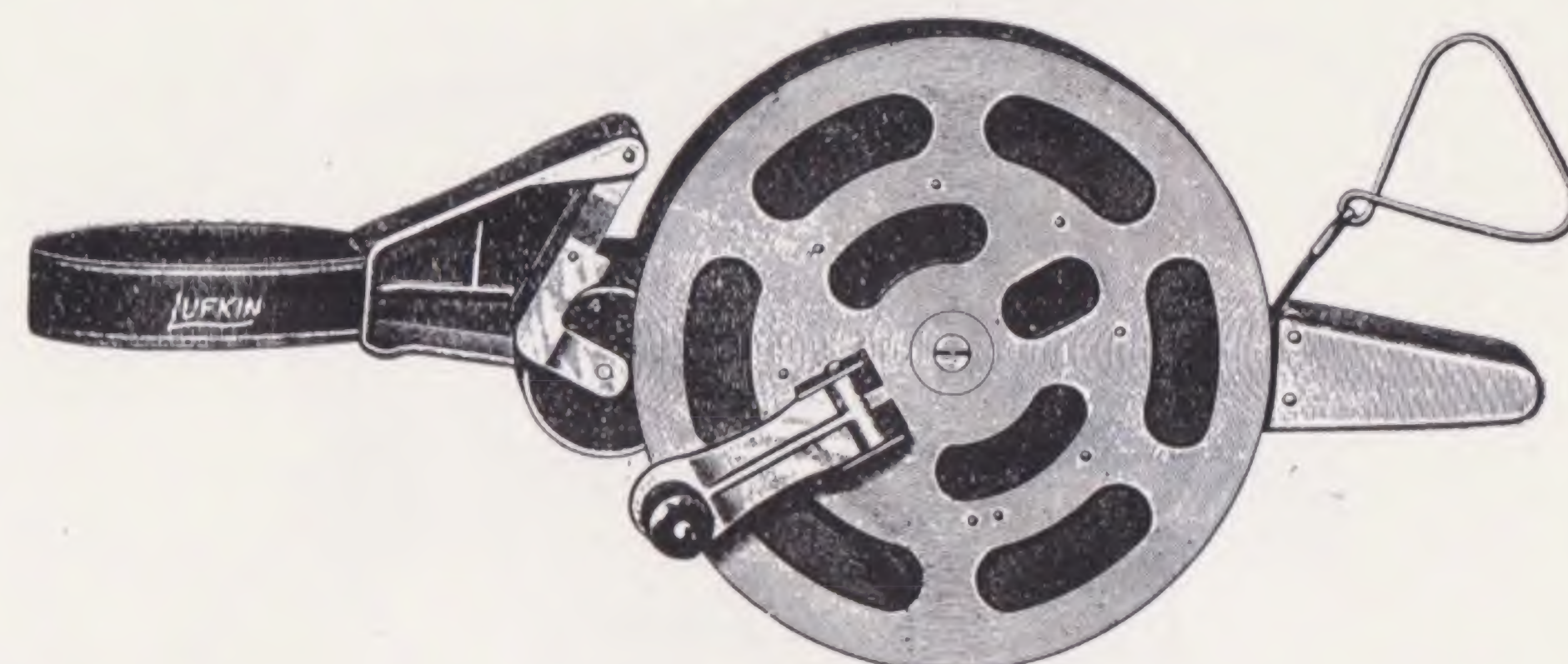
Chesterman's Light Compound Steel Band Chain

Exceedingly portable and light, composed of two or more separate 4-pole bands, made detachable by swivels and hooks, which can be used in lengths of one, two, or more chains. The first chain of each set is divided in the usual manner into links, and numbered at every ten, the other chains not being subdivided.

Each set wound up on steel cross. Metal reel extra.

	Chains					Feet				Code Word
	2	3	4	5	..	200	300	400	500	
No. 425— $\frac{1}{4}$ in. chain	16/-	20/-	25/-	30/-	..	20/-	27/-	34/-	42/-	each Laird
No. 426— $\frac{3}{8}$ in. "	16/-	20/-	24/-	28/-	..	18/-	24/-	30/-	36/-	.. Lagoon
No. 427— $\frac{1}{2}$ in. "	12/-	15/-	18/6	22/-	..	15/-	18/-	22/-	28/-	.. Lamel
Metal Reels in place of Crosses for any of the above						..	7/-	each	..	Laical

The "Cripple Creek" Reel



No. 429



No. 430

No. 429—Aluminium frame 14in. long, nickel-plated steel reel 8in. diameter. A box-wood roller or spool is fitted between the sides of the reel, which, by means of a spring, presses towards the axis of the reel, causing the tape to wind up evenly and tightly in its place. A long folding handle, giving a winding leverage of nearly 5in., enables the tape to be wound up with exceptional ease and rapidity. Leather strap at one end for carrying purposes.

This reel is especially designed for chain tapes Nos. 397-399, 405-410, and 425-427, and will carry $\frac{1}{8}$ in. tape up to 1,000ft. in length, or $\frac{1}{4}$ in. tape up to 500ft. in length.

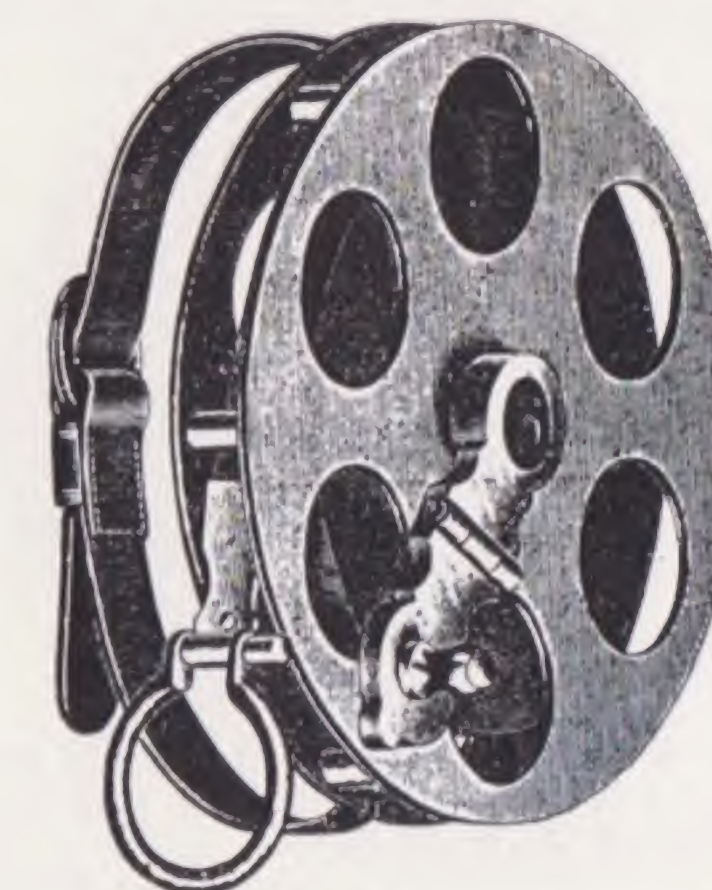
	Price	Code Word
"Cripple Creek" Reel	£2 0 0	.. .. Lain

Staff for "Cripple Creek" Reel

No. 430—40in. long, of hard maple wood, aluminium socket with heavy set screw at one end into which reel fits and is securely fastened. The other end is finished with heavy brass ferrule and steel point, for setting firmly into the ground. This staff forms a complete support for the "Cripple Creek" Reel, and is very compact and light.

	Price	Code Word
Staff only	14/-	.. .. Lair

"Wolverine" Steel Tapes



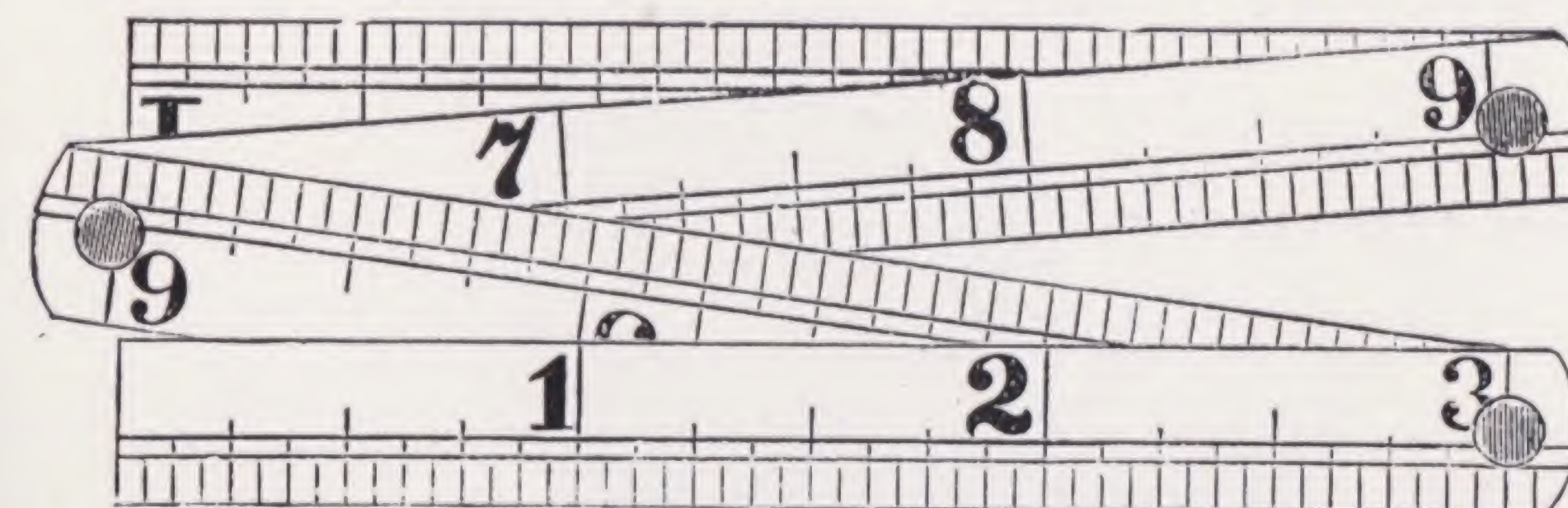
Nos. 432-433

Weight of 100ft.
Reel **8 oz.**
complete.

Open aluminium reel with nickel-plated brass folding handle. Leather strap on the reverse side by which the tape can be firmly held while winding. Extremely light yet strong and durable.

Marked Ft. and 12ths (inches and eighths)	Marked Ft., 10ths, and 100ths of Ft.	Length	Diam. of Reel	Price	Code Word
No. 432 (1374)	No. 432D (1374)	66ft.	4 $\frac{1}{2}$ in.	£1 4 6	Lamish
No. 433 (1376)	No. 433D (1376)	100ft.	5 $\frac{1}{4}$ in.	1 14 6	Lamp

Surveyors' Folding Steel Pocket Rules

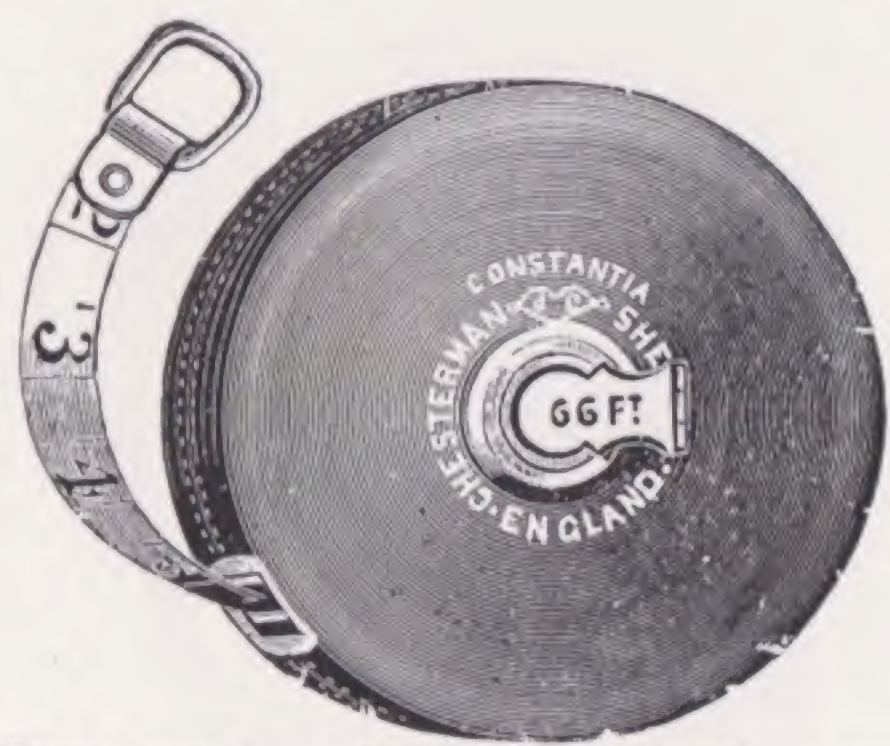


Marked inches and sixteenths one side. Feet, tenths, and hundredths of feet the other. In Leather Cases.

	Price	Code Word
No. 434—1ft. .. $\frac{1}{8}$ in. \times 28 G. .. 4in. Joint .. 3 Fold	1/9	.. Lampie
No. 435—2ft. .. $\frac{1}{8}$ in. \times 28 G. .. 4in. Joint .. 6 Fold	2/6	.. Lamprey
No. 436—3ft. .. $\frac{1}{8}$ in. \times 28 G. .. 4in. Joint .. 9 Fold	3/-	.. Lanary
No. 437—2ft. .. $\frac{1}{8}$ in. \times 26 G. .. 6in. Joint .. 4 Fold	2/6	.. Lanate
No. 438—3ft. .. $\frac{1}{8}$ in. \times 26 G. .. 6in. Joint .. 6 Fold	3/-	.. Lance

Chesterman's Patent "Constantia" Linen Tapes

Nos. 440-443

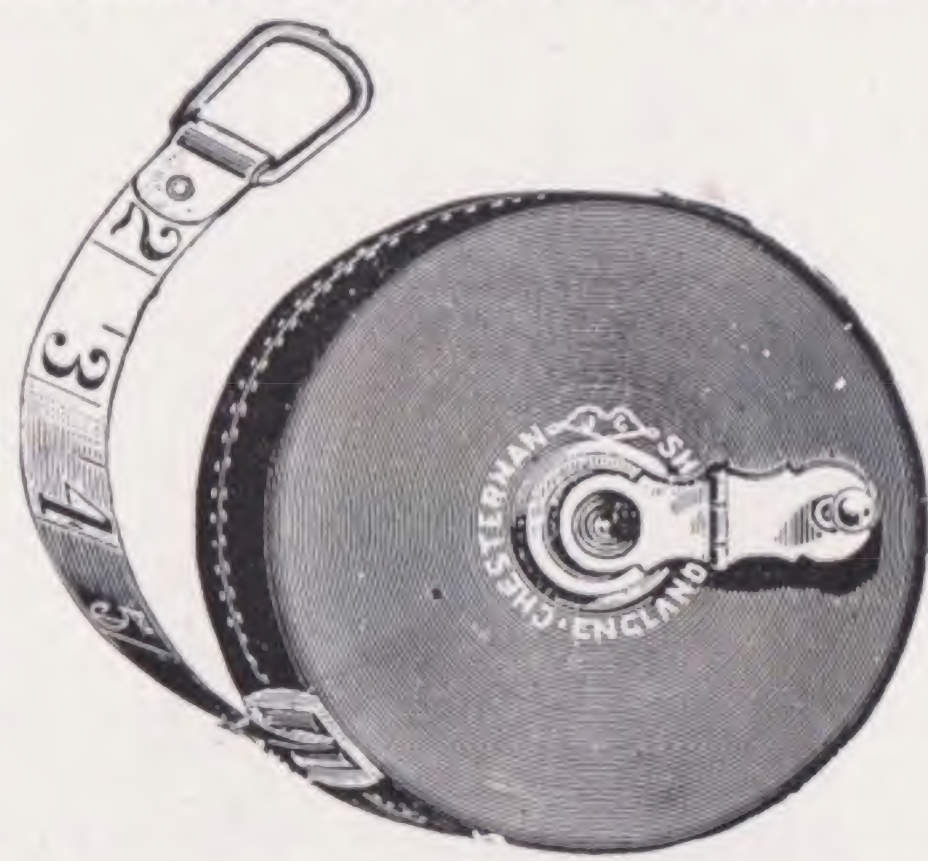


The Best Woven Tape made. $\frac{5}{8}$ in. wide, in leather case. Tapes marked feet, inches, and halves one side, and links and poles on the back; also feet into tenths one side, and links and poles on the back.

	PRICES					Code Word
	25ft.	33ft.	50ft.	66ft.	100ft.	
No. 440—Folding handle, feet, 12ths and links	4/7	5/3	6/6	7/6	10/6	Landse
No. 441—Folding handle, feet, 10ths and links	4/7	5/3	6/6	7/6	10/6	Landau
No. 442—Flush handle, same divisions	5/1	5/9	7/-	8/3	11/6	Lander
No. 443—Tapes only, to re-fill cases	2/2	2/9	3/9	4/6	7/3	Lane

Chesterman's Patent Metallic Tapes

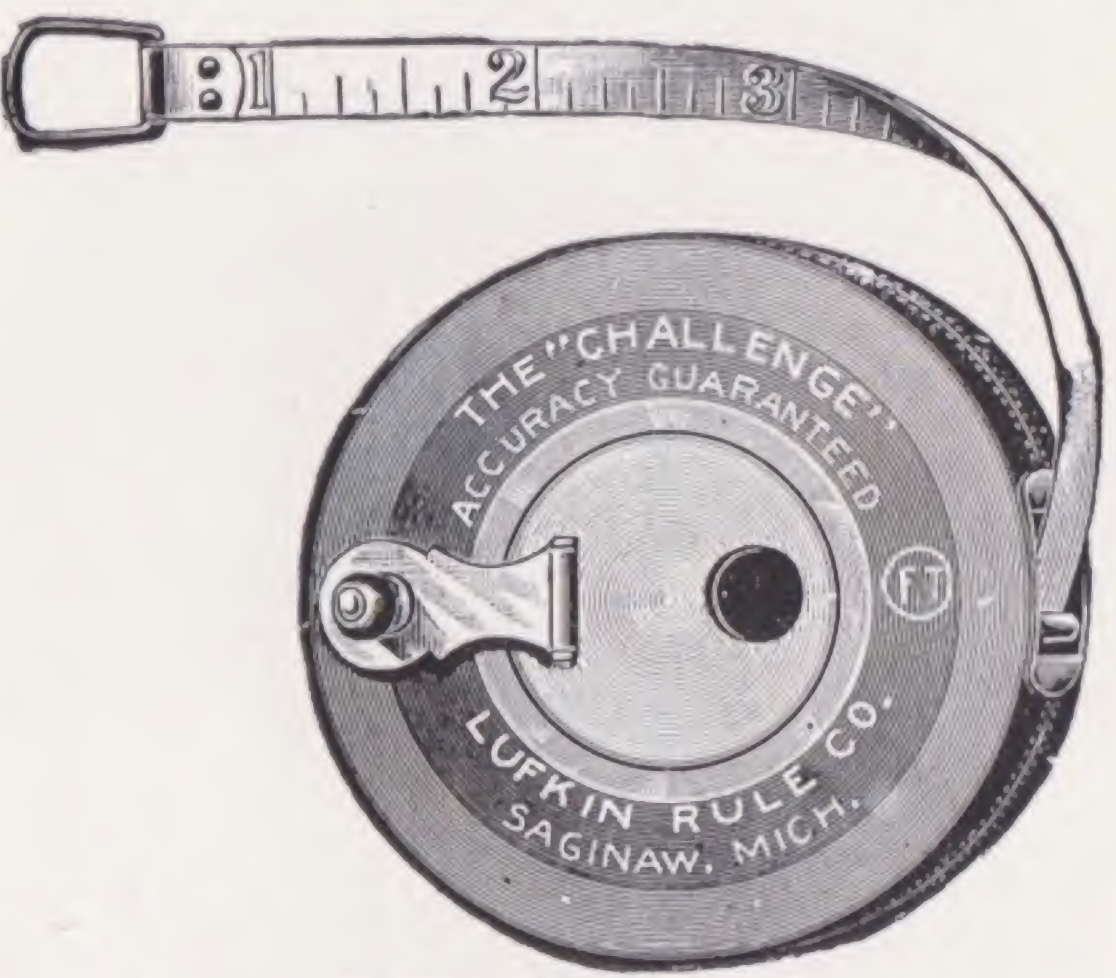
Nos. 444-446



Made of specially woven tape, $\frac{5}{8}$ in. wide, of the finest linen thread interwoven with steel wire.

	PRICES			Code Word
	50ft.	66ft.	100ft.	
No. 444—Folding handle	6/6	7/6	10/6	Langrel
No. 445—Flush handle	7/-	8/3	11/6	Lanner
No. 446—Tapes only	3/9	4/6	7/3	Laocoon

"Challenge" Steel Tapes



Nos. 450-453.

Tape $\frac{3}{8}$ in. wide in hard leather case, nickel-plated trimmings, flush handle, marked on one side only.

Marked Ft. and 12ths (inches and eighths)	Marked Ft., 10ths, and 100ths of Ft.	Length	Diam. of Case	Price	Code Word
No. 450 (260)	No. 450D (260)	25ft.	2 $\frac{3}{4}$ in.	11/-	Lapic
No. 451 (263)	No. 451D (263)	50ft.	3 $\frac{1}{4}$ in.	13/-	Lapis
No. 452 (264)	No. 452D (264)	66ft.	3 $\frac{3}{4}$ in.	16/-	Lapper
No. 453 (266)	No. 453D (266)	100ft.	4 $\frac{1}{2}$ in.	21/6	Lappet

Chesterman's
Finest Quality
Steel Measures



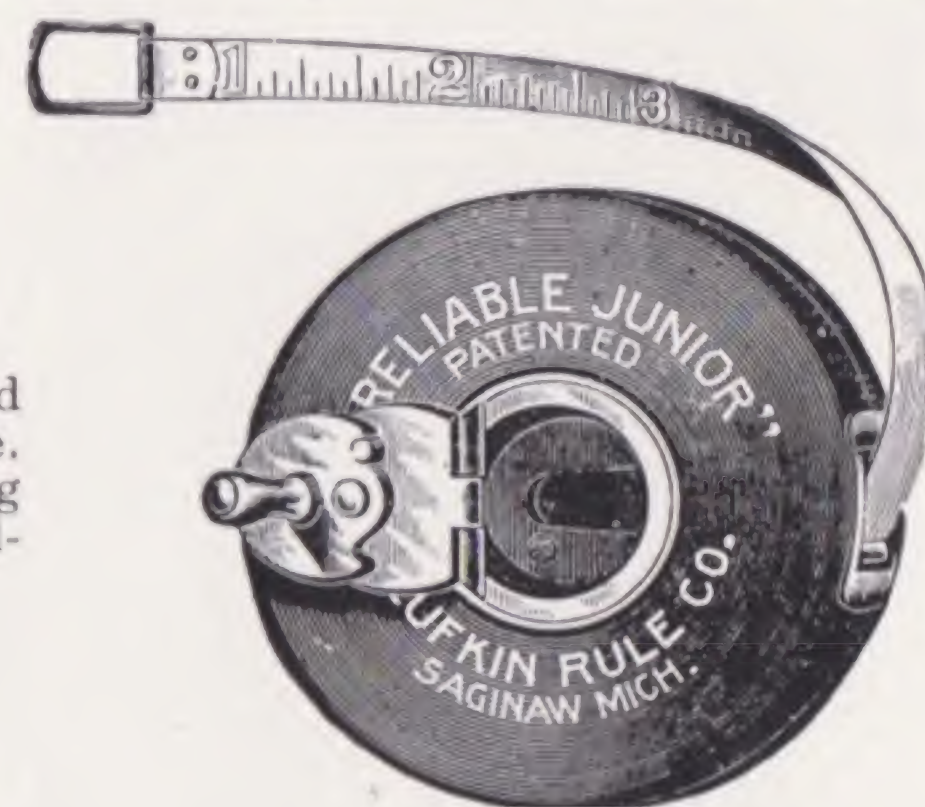
Nos. 454-455

Steel tape, marked inches and 16ths, fitted into well-finished German silver case

No. 454—4ft. long	3/6	.. ..	Larch
No. 455—6ft. long	4/6	.. ..	Lares

"Reliable Junior" Steel Tapes

Tape $\frac{1}{4}$ in. wide, fitted into hard leather case. Patent double folding flush handle. Nickel-plated trimmings.



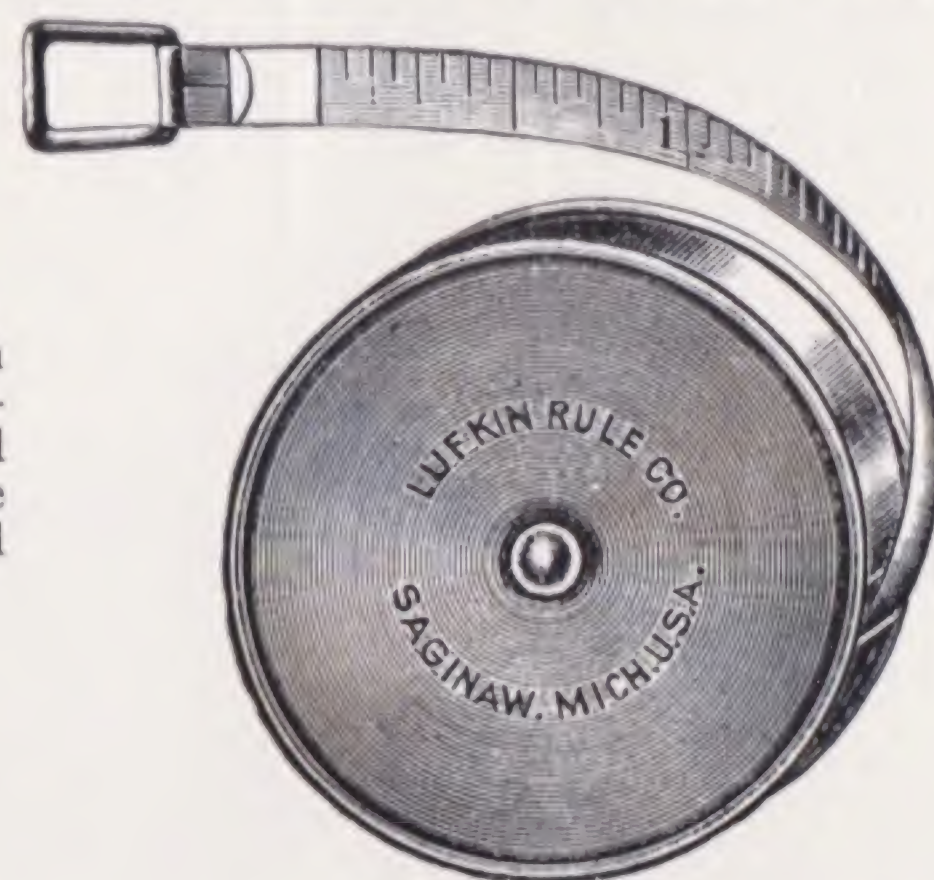
Nos. 457-458

Marked Ft. and 12ths (inches and 16ths)	Marked Ft., 10ths, and 100ths of Ft.	Length	Diam. of Case	Price	Code Word
No. 457 (100)	No. 457D (100)	25ft.	2 $\frac{1}{4}$ in.	10/-	Largo
No. 458 (103)	No. 458D (103)	50ft.	2 $\frac{3}{4}$ in.	12/6	Lariat

The above is a convenient vest pocket Tape; 25ft. weighs only 3 ozs., 50ft. only 5 ozs. complete.

Surveyors' Pocket Steel Tapes

Spring wind, with centre stop, in German-silver case. Marked inches and 16ths on one side, feet, 10ths, and 100ths other side.



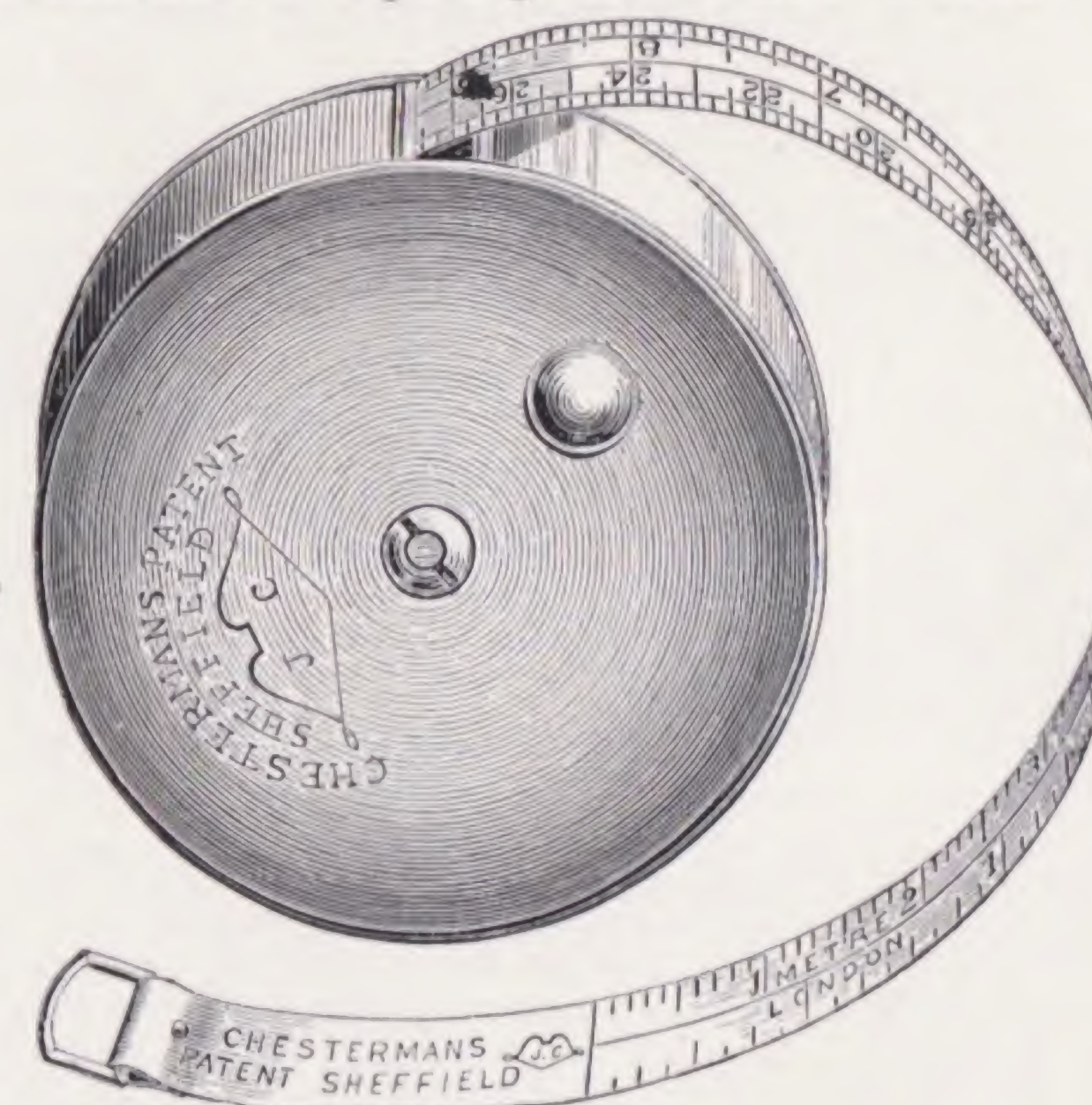
Nos. 460-463

No.	Length	Width	Price	Code Word
No. 460 (153D)	3ft.	$\frac{1}{4}$ in. wide	2/6	Larmier
No. 461 (158D)	5ft.	$\frac{1}{4}$ in. wide	3/6	Larum
No. 462 (156D)	6ft.	$\frac{1}{4}$ in. wide	4/-	Larva
No. 463 (1510D)	10ft.	$\frac{5}{16}$ in. wide	5/6	Larval

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Chesterman's Spring Measure Steel Tapes

Nos. 466-467

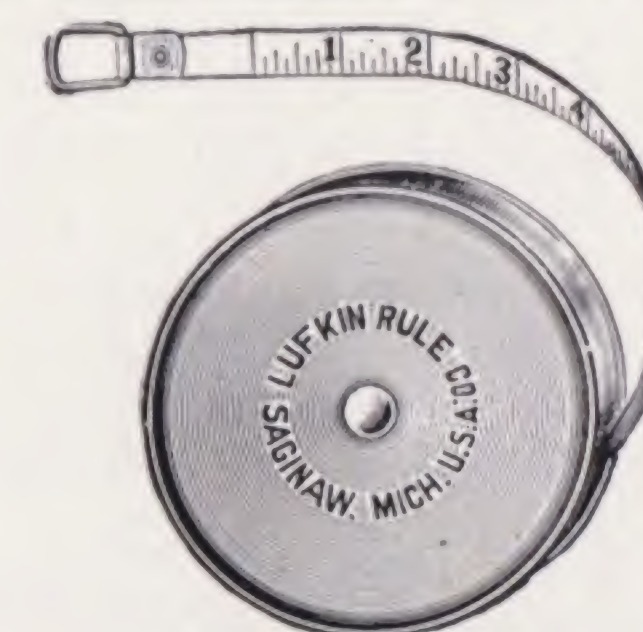


$\frac{3}{4}$ in. wide, in German silver case with spring stop. Specially adapted for architects and engineers.

2 metres long, marked on one side inches and metres, and on the other side one or other of the following scales:-

No.	Description	Price	Code Word
No. 466	For mechanical draughtsmen, 12 fully divided 12in. duodecimal scales ranging from $\frac{1}{16}$ in. to 3in.	5/6	Lash
No. 467	For architects, 8 fully divided duodecimal scales and 4 chain scales 10 to 40	5/6	Lasso

"Petit" Pocket Steel Tape



No. 468

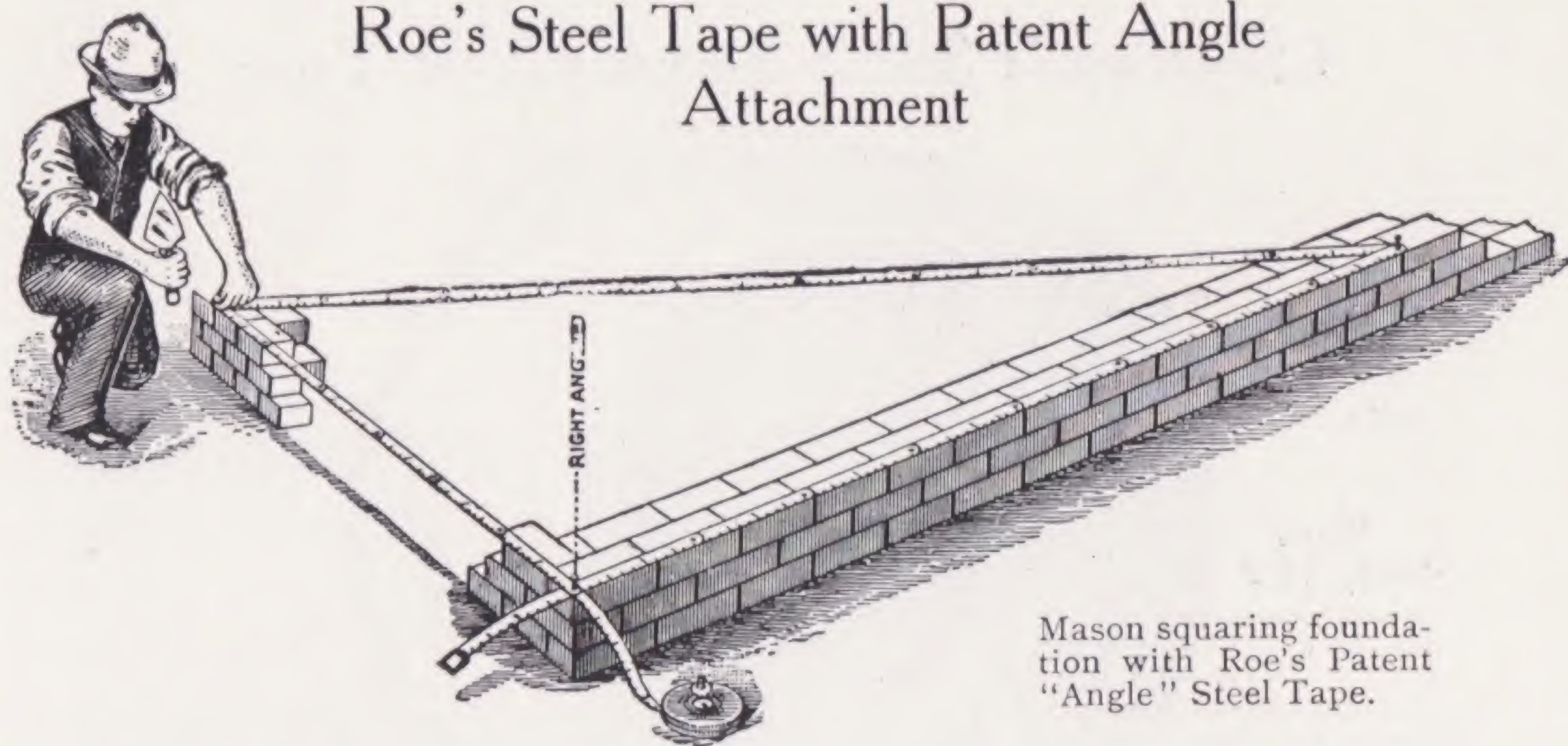
Spring wind
Centre stop
German silver case
 $1\frac{1}{16}$ in. diameter

No.	Description	Price	Code Word
No. 468 (153B)	36in. long, marked inches, 16ths one side only	2/-	Latch

F

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Roe's Steel Tape with Patent Angle Attachment



Mason squaring foundation with Roe's Patent "Angle" Steel Tape.

Roe's Steel Tape, with Patent Angle Attachment, consists of a strong Steel Tape, $\frac{3}{8}$ in. wide, graduated on one side only, into feet, inches, and eighths, or feet, 10ths, and 100ths, in leather and metal cases. Its accuracy is guaranteed.

This tape can be used for **all kinds of measurements**, and also for laying out *right angles* much quicker than by any other method and equally accurate.

Its principle is the old trigonometrical formula that 6, 8, and 10 feet sides of a triangle secure a right angle. This formula is embodied in this tape, by providing it at the 1, 9, 19, and 25 feet marks with eyelets, the 9 and 19 feet marks being joints. To use the tape, fasten it at the starting point with a small marking pin or nail through the eyelet at figure 1 on the tape; then fasten it at figure 9 as shown in illustration; place the 25ft. mark over the starting point and taking hold of the tape at the 19ft. mark, pull it straight as shown in the cut. You will then have a *perfect right angle* at the starting point.

Fitted into Hard Leather Case.

Marked Ft. and 12ths (inches and eighths)	Marked Ft., 10ths, and 100ths of Ft.	Length	Price	Code Word
No. 470 (240)	No. 470A (240)	25ft.	12/6	Mace
No. 471 (242)	No. 471A (242)	50ft.	15/6	Macula
No. 472 (244)	No. 472A (244)	75ft.	20/-	Magian
No. 473 (246)	No. 473A (246)	100ft.	26/-	Magilp

As above, but fitted into metal case in place of leather, nickel-plated, 2/- each less.

Roe's Steel Band Chains

Fitted on Patent Reel

	Price	Code Word
No. 474—100ft. long, graduated every ft., end ft. in 10ths ..	20/-	Laity
No. 475—200ft. long, do. do. ..	30/-	Lama
No. 476—100 links, graduated every link ..	20/-	Lame

Invar Measuring Tapes and Base Line Apparatus

Base lines are the foundation of all geodetic measurements, and great accuracy is of the utmost importance. The invention of Invar by Dr. Ch. Ed. Guillaume, of the International Bureau of Weights and Measures at Sèvres, has simplified the problem of temperature correction, &c., and absolute accuracy is now attained by the Invar Measuring Tapes.

Wire or tape made from Invar has a coefficient of expansion incredibly small. The latest tape has (as certified by the National Physical Laboratory) a thermal expansion of less than 1×10^{-7} per degree C. Thus in actual use the temperature correction may be neglected.

No. 480—Standard Invar Tape, $\frac{1}{8}$ in. wide, 50 metres long. One decimeter at each end divided into millimetres. Accuracy of total length about 1 in 400,000. Special aluminium reel and teak case, arranged for conveniently winding and unwinding tape in the field. National Physical Laboratory Certificate for the total length, and coefficient of thermal expansion supplied with each tape.

Price complete as above .. £20 0 0 .. **Code Word** *Ravin*

No. 481—Standard Invar Tape, $\frac{1}{8}$ in. wide, 100 ft. long. One foot at each end divided into tenths. Marked for use hanging in the air, or supported the whole length. Special reel and teak case. National Physical Laboratory Certificate for total length and coefficient of expansion supplied with each tape.

Price complete as above .. £12 0 0 .. **Code Word** *Ravine*

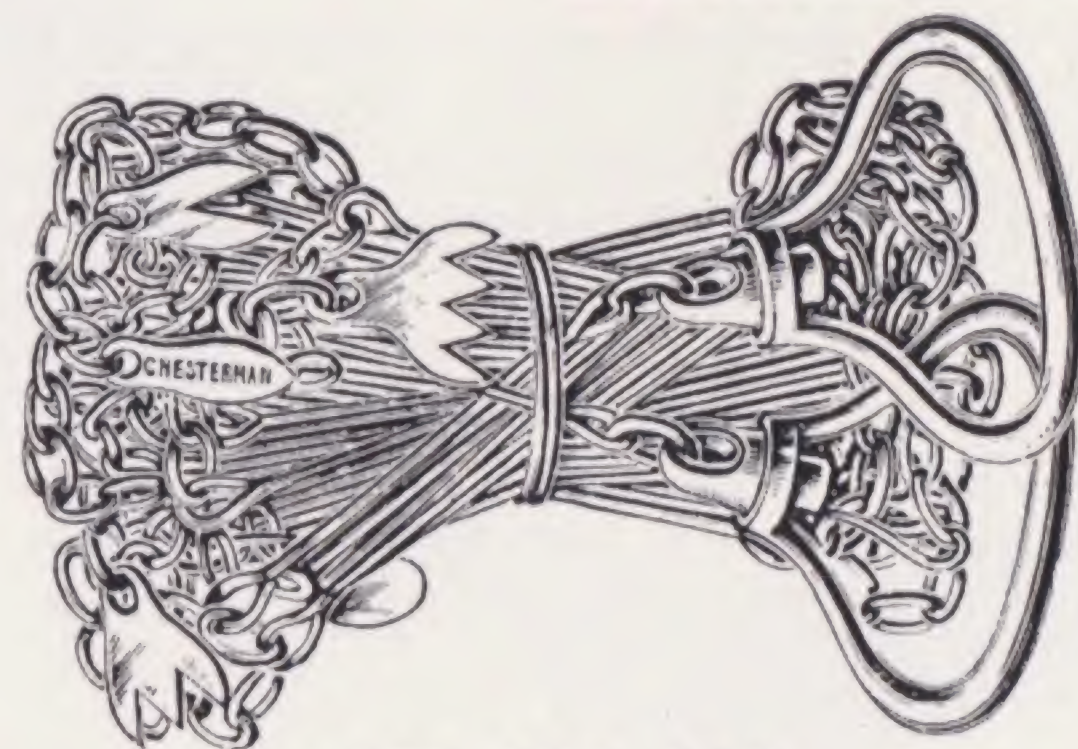
No. 482—Complete Base Line Apparatus, consisting of 2 Standardised (at National Physical Laboratory) Invar Tapes, $\frac{1}{8}$ in. wide, 100ft. or 24 metres long, in case, with drums, &c., 2 weights, 2 ball-bearing pulleys, with ball-bearing swivels, 2 stands for supporting pulleys, silk cord, with teak cases for the pulleys, weights, &c.

Price complete as above .. £40 0 0 .. **Code Word** *Ravines*

No. 483—"Repsold" Plumb Robs for transferring marks to the ground.

Per pair £15 0 0 .. **Code Word** *Ravinace*

Chesterman's Land Chains



Made of the best steel wire. Three oval rings, brass swivel handles and tallies.

The 4-pole Chain is divided into links and tallied at every 10 links.

The 100ft. Chain is divided into feet and tallied at every 10 feet.

Nos. 485-488						Price	Code word
No. 485—No. 8 W.G., extra strong	..	..	4 poles	..	..	15/-	.. Lateen
No. 486—No. 8 W.G., do.	..	..	100 feet	..	..	18/-	.. Latent
No. 487—No. 12 W.G.	..	..	4 poles	..	..	12/-	.. Lathe
No. 488—No. 12 W.G.	..	..	100 feet	..	..	14/-	.. Lathy

Land Chain Arrows

15in. long, cast steel wire, hardened, tempered, and black enamelled. In sets of 10.
No. 490—No. 8 W.G., 1/6 No. 7 W.G., 2/- No. 6 W.G., 2/3 per set .. Ketch

Weighted Chain Arrows

No. 491—8oz. .. 1/9 14oz. .. 2/- each .. Kibe

Tension Handle



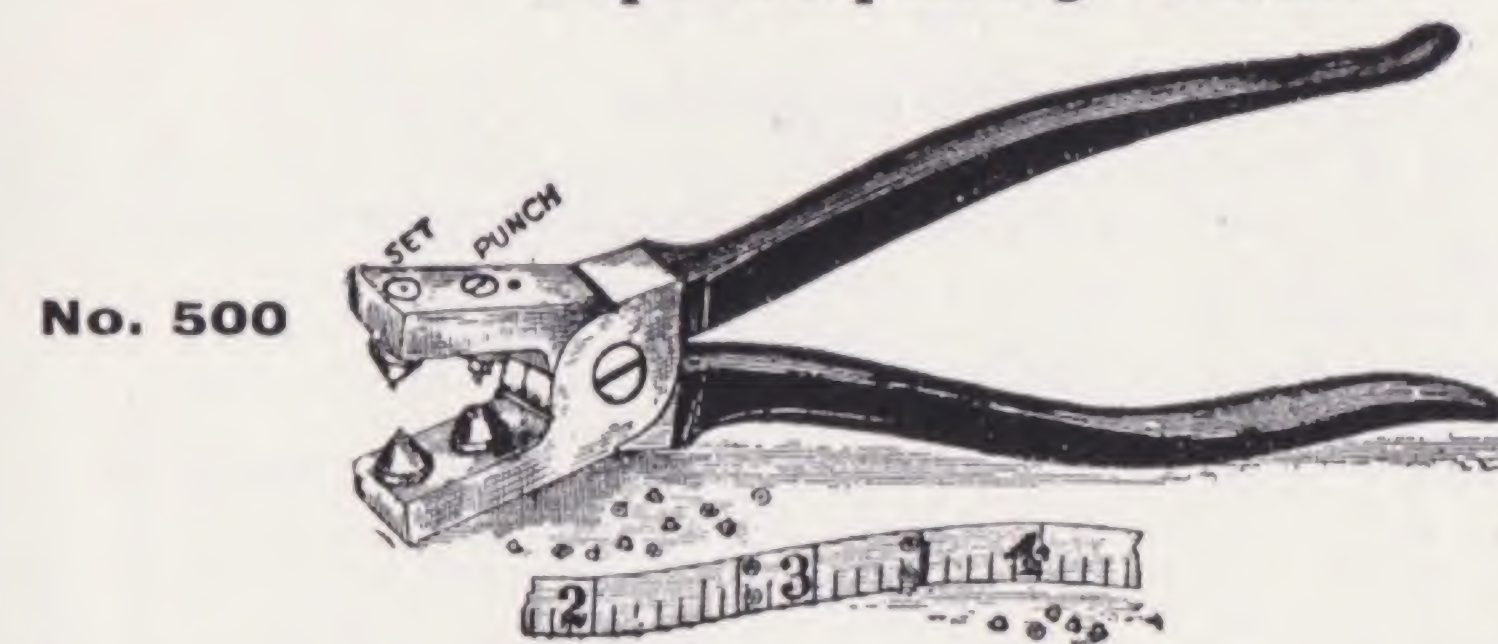
No. 495

No. 495—For applying the exact tension at which a steel tape is standard. Brass, nickel-plated. Indicating tension by 1/2 lbs. up to 20 lbs. ... Price 8/- .. Code Word Latin

Clamp Handles

	Price	Code Word
No. 496—Detachable handles for Engineer's Tapes, 1in. (round), per pair 2/- .. 3 in. (oval), per pair	3/6	.. Latria
No. 497—Ditto for attaching to any part of a steel tape .. each	2/6	.. Laud

Tape Repairing Outfits



No. 500

Kelly's Improved Outfit consists of an improved punch and 1,000 eyelets and rivets.

To repair broken tape, match a scrap piece so as to come equal with the graduations, then punch holes about 1/2 in. back from break and rivet same. Act similarly with the other end, then file both ends smooth. The tape thus mended will be as strong as when new.

	Price	Code Word
No. 500—Kelly's Improved Tape Repairing Outfit ..	£ 1 2 6	.. Laurel
No. 501—Eyelets per 1,000 ..	0 5 6	.. Lava

No. 502—Chesterman's Repair Outfit comprises:
Hand punch, 2 doz. brass sleeves, 1 gross rivets, 1 spare punch, in box complete .. 0 13 0 .. Lave

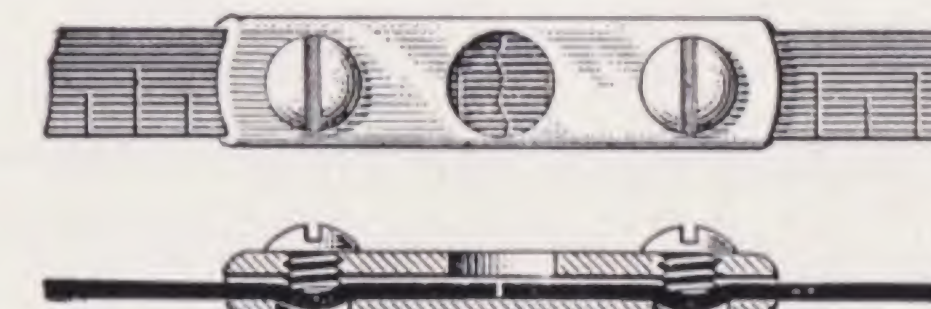
"Eureka" Tape Repairing Outfit

Consists of a metal sleeve which is coated with soft solder and flux. After cleaning the ends of the broken tape with a knife or sandpaper, they are inserted in sleeve and hammered down. A lighted match is then held underneath and burned out, this completing the repair.

	Price	Code Word
No. 503—In package of 1 doz. ..	3/9	.. Laver
No. 504—In package of 1/2 doz. ..	2/3	.. Lavish

Size of tape should be sent when ordering.

Little Giant Tape Splice



No. 505

Insert the broken ends of tape and adjust by sight holes, then tighten up screws by knife blade. Will not catch on obstructions, and holds against the strongest pull. For tapes 1/10 in., 1/8 in., 3/16 in., 1/4 in., 5/16 in., 3/8 in., or 1/2 in. wide. Give width of tape when ordering.

	Price	Code Word
No. 505—Three for ..	4/6	.. Law

Drawing Papers

Whatman's Papers

The manufacturers of Whatman's Papers are now making an Extra Hard-sized Paper for tropical climates, and we supply all export orders with this paper unless specially ordered otherwise.

Supplied in two surfaces:—

H.P. i.e. Hot Pressed or Smooth surface.

N. „ Not hot pressed or Medium grained surface.

			£	s.	d.
No. 520—Demy.	20in. × 15in.	Ordinary thickness	0	2	3
No. 521—Imperial.	30in. × 22in.	„	0	7	0
No. 522—Imperial.	30in. × 22in.	Thick	0	7	6
No. 523—Imperial.	30in. × 22in.	Ex. thick	0	11	6
No. 524—D'ble Elephant.	40in. × 27in.	Selected	0	12	9
No. 525—D'ble Elephant.	40in. × 27in.	Ex. thick	1	0	0
No. 526—Antiquarian.	52in. × 30in.	„	2	15	0

Joynson's Extra Superfine Drawing Papers

Rolled or Machine Finished		Per ream	Per quire	
		£ s. d.	£	s. d.
No. 527—Demy.	20in. × 15½in. 42 lbs.	1 19 0	0	2 10
No. 528—Imperial.	30in. × 22in. 72 lbs.	4 4 0	0	5 0
No. 529—Imperial.	30in. × 22in. 90 lbs.	5 5 0	0	6 6
No. 530—D'ble Elephant.	40in. × 27in. 130 lbs.	7 5 0	0	9 6
No. 531—D'ble Elephant.	40in. × 27in. 150 lbs.	8 15 0	0	11 0
No. 532—Antiquarian.	52½in. × 30½in. 250 lbs.	14 5 0	0	19 6
No. 533—Emperor.	72in. × 48in. 535 lbs.	27 5 0	1	19 0

Other sizes and weights can be supplied.

Joynson's Papers can also be supplied mounted on White or Brown Holland to order.

Cartridge Drawing Paper

		£	s.	d.
No. 534—30in. × 22in.	Per quire	0	3	3
No. 535—40in. × 27in.	„	0	3	6

Continuous Drawing Papers

No. 536—Extra Quality Drawing Paper (No. 417)—			
Width	30in.	40in.	60in.
Price per 50 yard roll	£1 5 0	£1 13 6	£2 10 0
Price per 10 yard roll	0 5 6	0 7 0	0 10 6
No. 537—Medium-substance Cartridge Paper (No. 422)—			
Width	30in.	60in.	
Price per 50 yard roll	£0 8 4	£0 16 8	
Price per 10 yard roll	0 1 10	0 3 8	
No. 538—Thin Detail Cartridge Paper (No. 421)—			
Width	30in.	60in.	
Price per 50 yard roll	£0 12 6	£1 5 0	
Price per 10 yard roll	0 2 8	0 5 3	

Special quotations for large quantities of any of the above papers.

The numbers in brackets quoted above refer to the numbers in our Sample Book of Papers and Linens, a copy of which will be mailed to any address on request.

Drawing Papers—(Continued)

Buff Cartridge Paper—continuous

No. 540—Extra Strong Tinted Drawing Paper (No. 600)—

This paper is very tough and strong, stands erasure exceptionally well, takes ink, pencil, and colours perfectly. The colour is agreeable to the eye and permits of handling without soiling.

	36in.	42in.
Width	£ s. d.	£ s. d.
Price per roll of 50 yards	1 0 0	1 5 0
Price per roll of 10 yards	0 4 6	0 5 6

No. 541—Buff Sketching Cartridge Paper (No. 601)—

	36in.	42in.
Width	£ s. d.	£ s. d.
Price per roll of 50 yards	0 10 6	0 12 6
Price per roll of 10 yards	0 2 3	0 3 0

No. 542—Buff Detail Drawing Paper (No. 426)—

	30in.	60in.
Width	£ s. d.	£ s. d.
Price per roll of 50 yards	0 10 6	1 1 0
Price per roll of 10 yards	0 2 3	0 4 6

Mounted Drawing Papers—continuous

All export orders for Whatman's Mounted Papers will be supplied with the extra hard-sized paper specially suited for tropical climates unless ordered otherwise.

No. 543—Whatman's H.M. Drawing, in rolls of 25 yards—

(No. 433) Mounted on Brown Holland, per	26in.	30in.	39in.	52in.	60in.
yard run	1/8	1/11	2/6	3/3	3/9
(No. 434) Mounted on White Holland, per					
yard run	1/6	1/8	2/2	2/11	3/4

No. 544—Extra Quality Drawing, medium substance, in rolls of 25 yards (No. 439)—

Mounted on Brown Holland, per yard run	27in.	30in.	40in.	54in.	60in.
	1/7	1/9	2/4	3/2	3/6

No. 545—Stout Drawing, in rolls of 25 yards (No. 444)—

Mounted on Cotton, per yard run	27in.	30in.	54in.	60in.
	1/-	1/2	2/-	2/3

No. 546—Extra Thin Drawing, in rolls of 25 yards (No. 448)—

Mounted on White Cotton, per yard run	30in.	60in.
	1/-	1/11

Special quotations for large quantities of any of the above papers.

The numbers in brackets quoted above refer to the numbers in our Sample Book of Papers and Linens, a copy of which will be mailed to any address on request.

Tracing Papers

No. 550— Transparent Detail Paper (No. 492)—														
Width	..	..	..	..	..	..	..	..	..	..	..	..	3in.	62in.
Price per 50 yard roll	..	..	..	..	..	..	..	..	..	..	..	..	5/6	10/-
Price per 10 yard roll	..	..	..	..	..	..	..	..	..	..	..	..	1/3	2/3
No. 551— Tracing Paper , medium substance, white (No. 496)—														
Width	..	..	..	..	..	..	..	..	..	..	..	..	..	40in.
Price per 20 yard roll	..	..	..	..	..	..	..	..	..	..	..	..	..	5/6
No. 552— Tracing Paper , unglazed, medium substance, blue (No. 495)—														
Width	..	..	..	..	..	..	..	..	..	..	..	..	..	40in.
Price per 20 yard roll	..	..	..	..	..	..	..	..	..	..	..	..	..	5/6
No. 553— Tracing Paper , extra strong, glazed blue (No. 498)—														
Width	..	..	..	..	..	..	..	..	..	..	..	..	30in.	40in.
Price per 20 yard roll	..	..	..	..	..	..	..	..	..	..	..	..	6/6	7/6

Special quotations for large quantities of any of the above papers.

Pounce, for Tracing Cloth

If Cloth will not take ink readily, rub a small quantity of Pounce into it, until the Cloth has lost its excessive gloss.

No. 554	per tin	6d.
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Tracing Cloth

No. 558—"Imperial" Tracing Cloth, (486), dull back, in rolls of 24 yards—				
(a) 30in. wide	per roll	£	s.	d.
(b) 36in. ,,	„	1	1	0
(c) 42in. ,,	„	1	2	9
(d) 48in. ,,	„	1	10	6
(e) 54in. ,,	„	1	18	0
Sagar's Tracing Cloth same price as "Imperial."				
No. 559—"Koh-i-noor" Tracing Cloth, dull back, in rolls of 24 yards—				
(a) 30in. wide	per roll	1	2	0
(b) 36in. ,,	„	1	5	0
(c) 40in. ,,	„	1	9	0
(d) 42in. ,,	„	1	13	0

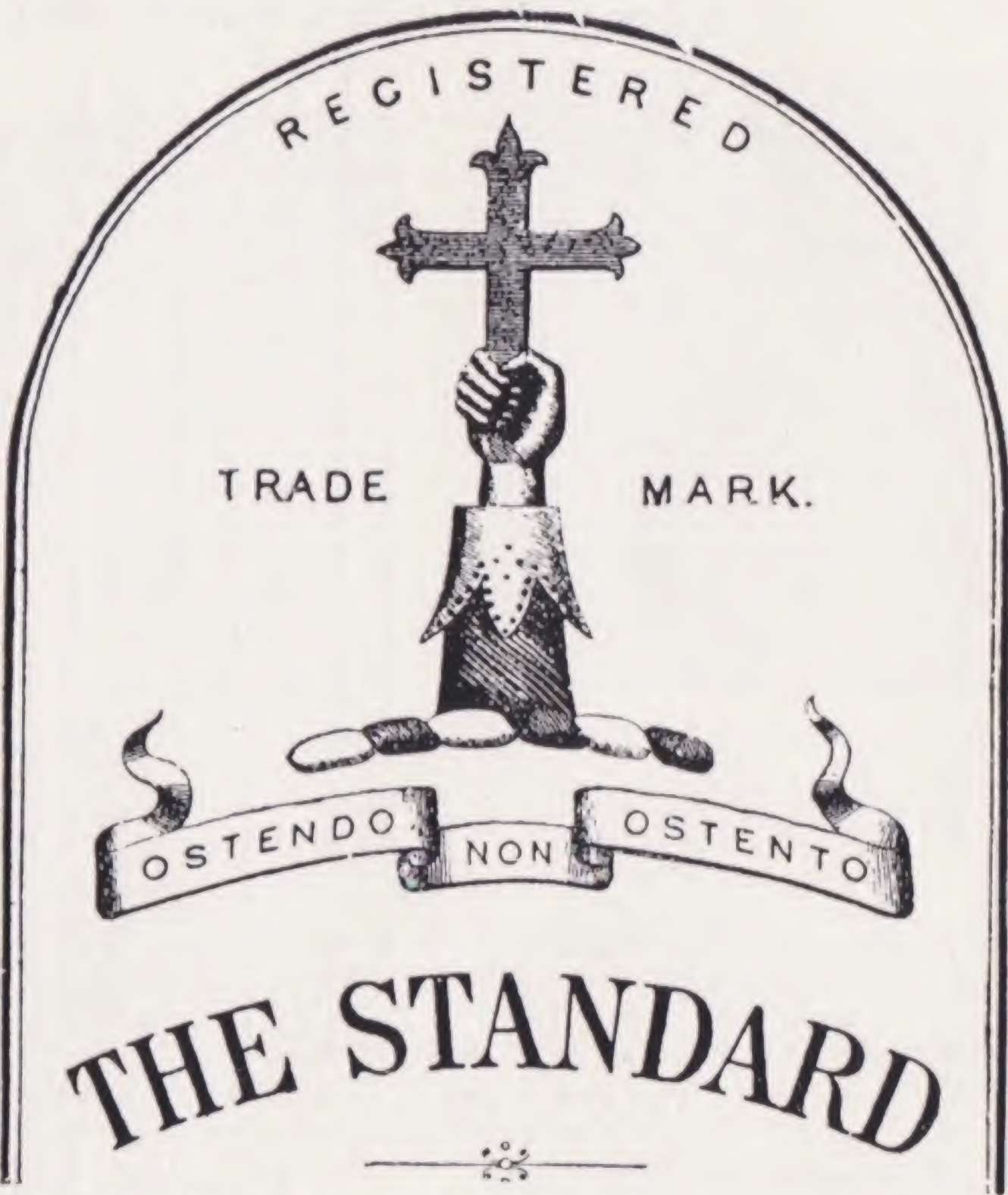
The numbers in brackets quoted above refer to the numbers in our sample book of Papers and Linens, a copy of which will be mailed to any address on request.

Tracing Cloth

(Continued)

We recommend this brand to all users of tracing cloth. It is supplied to the British Government, and has been adopted by many of the Government Departments, Railroads, Architects, and Engineers generally, in preference to higher priced cloths.

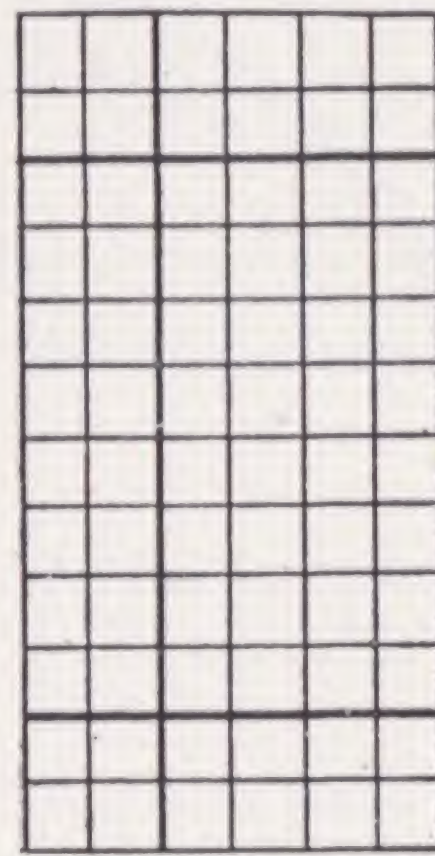
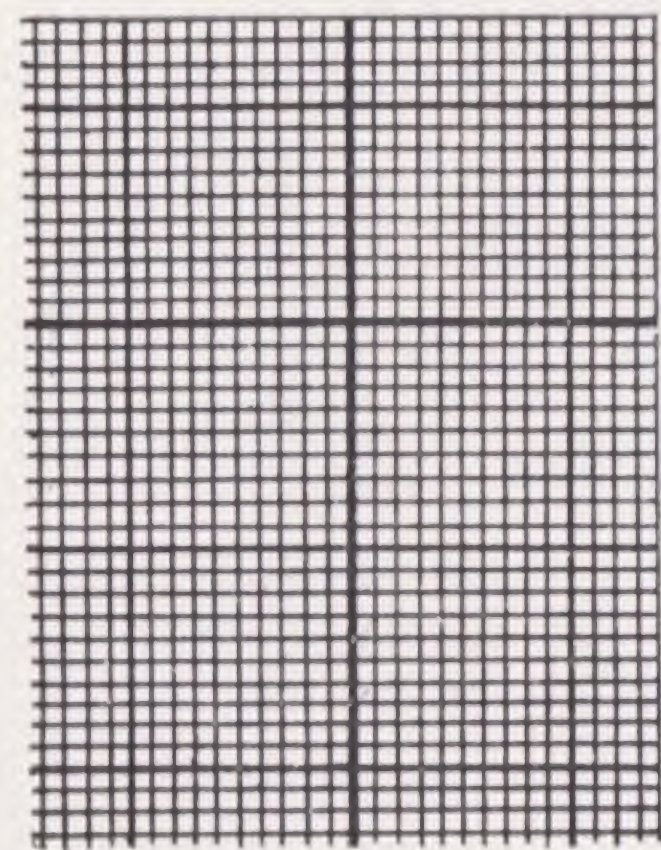
Against brands of equal quality, the "Standard" will compare favourably as to transparency and other qualities, and is exceptionally low in price.



No. 560—"Standard" Tracing Cloth, dull back, in rolls of 24 yards					£	s.	d.
(a) 30in. wide	per roll	0	18	0			
(b) 37/8in. ,,	„	1	2	0			
(c) 42/3in. ,,	„	1	6	6			
(d) 47/8in. ,,	„	1	14	0			
(e) 54in. ,,	„	1	16	0			
No. 561—"Arande" Tracing Cloth, dull back, in rolls of 24 yards							
(a) 30in. wide	per roll	0	16	3			
(b) 37/8in. ,,	„	1	0	0			
(c) 42/3in. ,,	„	1	4	6			
No. 562—"Reliance" Tracing Cloth, dull back, in rolls of 24 yards							
(a) 30in. wide	per roll	0	14	6			
(b) 37in. ,,	„	0	17	6			
(c) 43in. ,,	„	1	5	0			
No. 563—"Economic" Tracing Cloth, dull back, in rolls of 24 yards							
(a) 30in. wide	per roll	0	14	0			
(b) 37/8in. ,,	„	0	16	6			
(c) 40in. ,,	„	0	19	6			

Sample book of Tracing Cloths mailed on request.

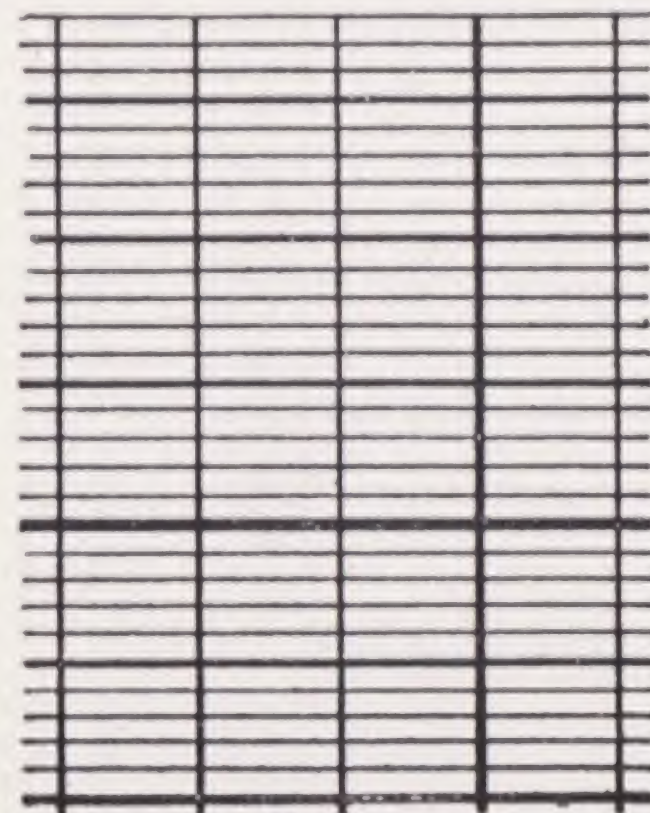
Cross-Section Papers and Cloths



These papers and cloths will be found of exceptional quality, only the finest paper and cloth being used, and the ruling being of great accuracy. In order to avoid shrinking the mounted papers are ruled after mounting, being plate printed. They are printed in inches and eighths, inches and tenths, inches and twentieths. Metric scale can also be supplied at the same prices.

No. 570—Sectional Paper (No. 1,200)	£ s. d.	No. 573—Sectional Tracing Cloth (No. 1,213/5)	£ s. d.
In rolls of 50yds. × 26in. ..	1 2 6	In rolls of 10yds. × 26in. ..	1 0 0
In rolls of 10yds. × 26in. ..	0 5 0		
No. 571—Mounted Sectional Paper (No. 1,206/8)		No. 574—Sectional Drawing Paper in sheets (No. 1,209)	
In rolls of 10yds. × 26in. ..	1 1 0	22½in. × 17½in., per ream..	2 10 6
No. 572—Sectional Tracing Paper (No. 1,210/2)		per quire..	0 3 0
In rolls of 10yds. × 26in. ..	0 7 6		

The above can be supplied in ream lots, any colour.



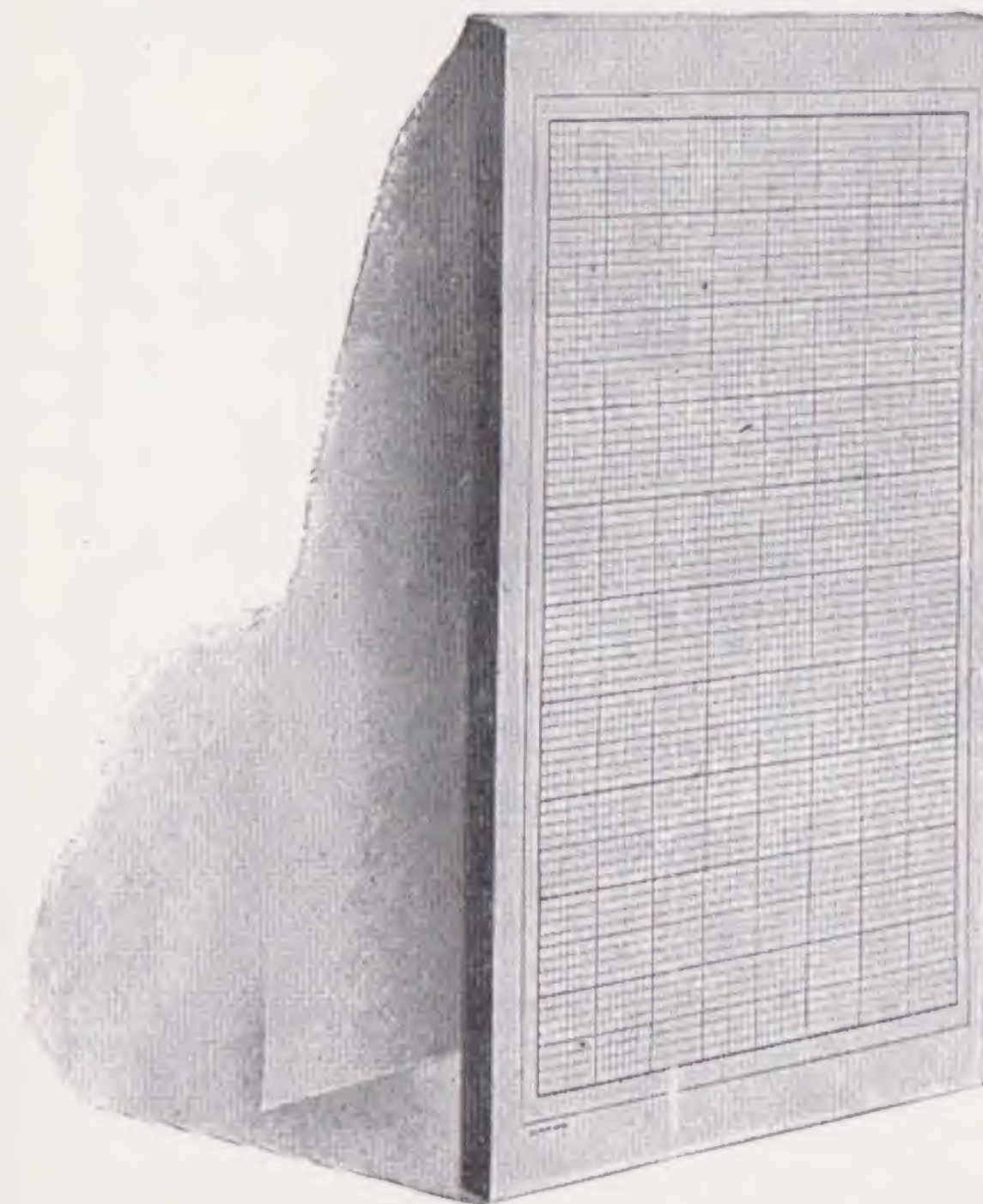
Profile Papers and Cloths

These papers and cloths are especially ruled for making longitudinal sections of railways, &c., and are largely used throughout the United States and Canada. The sections are printed 4 × 20 to 1in. The Tracing Cloth and Bond Paper are especially manufactured for photographic reproduction, both the profiles and the drawing being reproduced on the blue print.

No. 578—Profile Paper (No. 1,199)	£ s. d.	No. 579—Profile Bond Paper, semi-transparent (No. 1,196)	£ s. d.
In rolls of 50yds. × 22in. ..	1 2 6	In rolls of 50yds. × 22in. ..	1 2 6
In rolls of 10yds. × 22in. ..	0 5 0	In rolls of 10yds. × 22in. ..	0 5 0
No. 580—Profile Tracing Paper (No. 1,192)		No. 581—Profile Tracing Cloth (No. 1,194)	
In rolls of 20yds. × 22in. ..	£0 17 6	In rolls of 20yds. × 22in. ..	1 10 0

Although not listed or recommended, cheaper papers can be supplied to order. The numbers in brackets quoted above refer to the numbers in our Sample Book of Papers and Linens, a copy of which will be mailed to any address on request.

Cross-Section Pads, Blocks, and Books



Nos. 585—586

Sectional Pads of 50 sheets, plain border, inches and ½in., 20ths, 10ths, 12ths, or 8ths, or metric scale. Plate printed, on faint green or white paper.

	Price each
No. 585—12in. × 9½in. ..	4/-
No. 586—19in. × 12in. ..	7/6

Sectional Blocks, ruled ft. blue, 1in. and 8ths, 1in. and 10ths, 50 surfaces.

	Price per doz.
No. 587—8½in. × 5½in. ..	7/6
No. 588—11in. × 8½in. ..	12/-
No. 589—11in. × 17in. ..	25/-

Sectional Books, ruled ft. blue, 1in. and 8ths, 1in. and 10ths, 80 leaf, 6¼in. × 4in.

	Price per doz.
No. 590—¼ bd. leather ..	12/-
No. 591—Full bd. leather ..	20/-

Dimension Books

80 leaf, 6¼in. × 4in.

	Price per dozen
No. 595—¼ bound leather ..	12/-
No. 596—Full bound leather ..	20/-

Profile Books

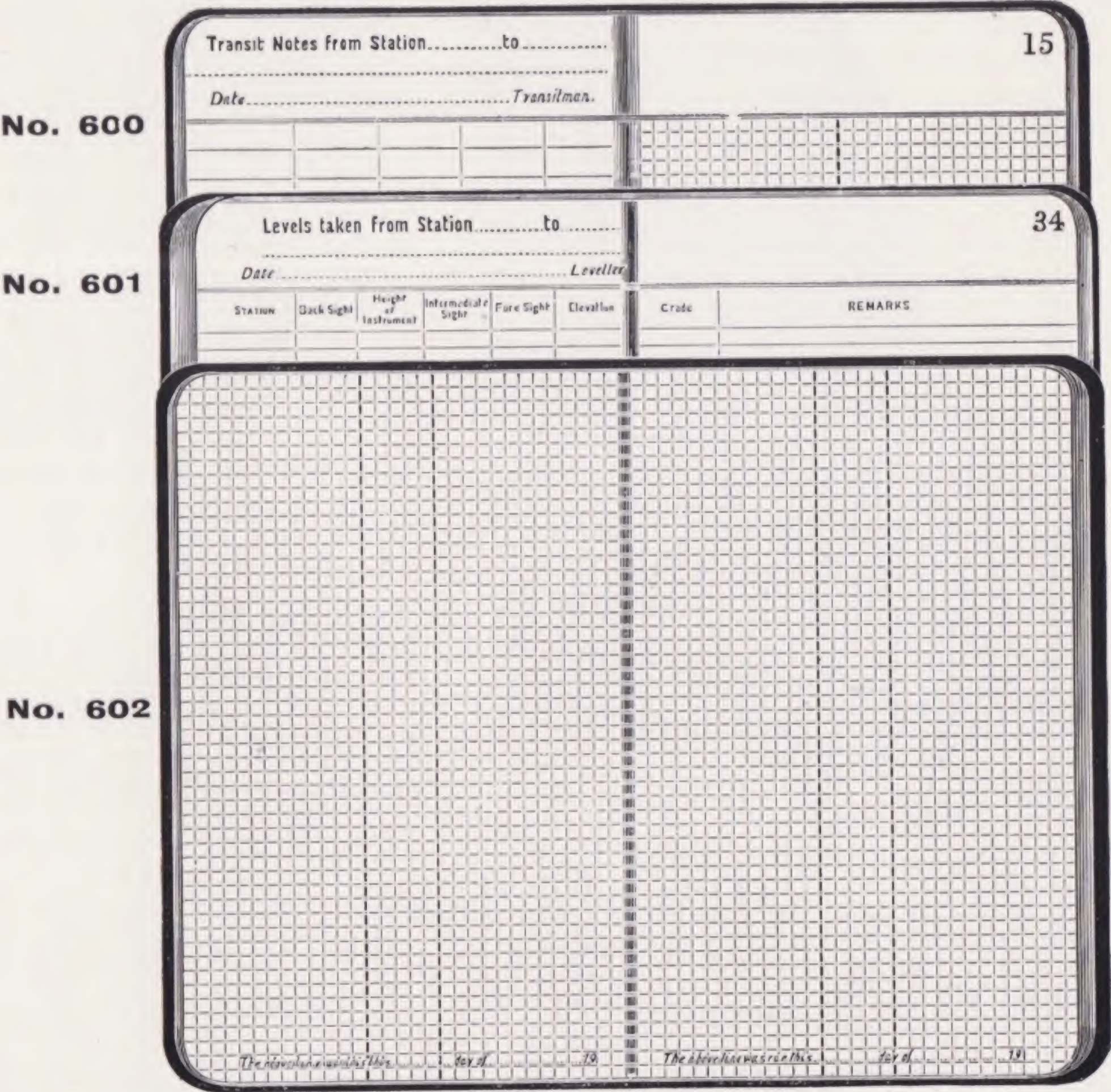
The paper is mounted on cotton, and folded like a map. Each double page is sufficient to contain 6,000ft. Morocco covers, flap and clasp.

No. 597—Ruled 4 × 20 to 1in., printed in green, 5in. × 7½in.	
Miles 12 25 50 100	
Price each 7/6 10/6 17/6 £1 10 0	

Not Continuous

No. 598—Ruled 4 × 20 to 1in., printed in green, 5in. × 7½in.	
Leaves 25 50 100	
Price each 1/- 2/- 3/-	

Transit, Level, and Field Books



All our books are printed with waterproof ink so that the lines will not run when used in rain or snow, bound in best leather, with round corners, and marked as shown.

					Price	Code Word
No. 600—Transit Book	4½in.×7¼in.	..	60 leaves	..	1/9	Lazar
No. 601—Level Book	.. 4½in.×7¼in	..	60 leaves	..	1/9	Lazuli
No. 602—Field Book	.. 4½in.×7¼in.	..	60 leaves	..	1/9	Leach

Other designs and patterns of books to order.

Photographic Printing Papers, &c.

Blue Print (Ferro-Prussiate) Papers and Linens

No. 605—Ordinary thickness, in 32ft. rolls	.. .. .	per roll	3oin. 1/9	4oin. 2/3
No. 606—Extra thick, in 32ft. rolls	.. .. .	..	2/9	4/-
No. 607—Mounted on Linen, in 10 yard rolls	.. .. .	..	7/6	10/-
No. 608—Cloth in 10 yard rolls	.. .. .	..	9/-	12/3

Black Line (Ferro-Gallic) Paper

Water Bath Development

This paper prints direct black lines on white background, and is developed by water only.

No. 609—Thin 110, 3oin. wide, in 10 yard rolls	.. .. .	per roll	5/6
No. 610—,, ,, 4oin. ,,	.. .. .	..	7/-
No. 611—Thick 150, 3oin. ,,	.. .. .	..	6/-
No. 612—,, ,, 4oin. ,,	.. .. .	..	8/-

Vandyke Photo Paper

From the original tracing a copy is made on thin Vandyke Paper, showing white transparent lines on opaque background. This negative is used to produce positive copies with either black lines on white background, or blue lines on white background. These prints are then exactly the same as the original drawing, and can be altered or added to as desired.

No. 613—Negative	3oin. wide, in rolls of 10 yards	.. .. .	per roll	6/-
No. 614—,,	4oin. ,,	.. .. .	..	8/-
No. 615—Medium	3oin. ,,	.. .. .	..	6/6
No. 616—,,	4oin. ,,	.. .. .	..	8/6
No. 617—Extra Thick	3oin. ,,	.. .. .	..	9/-
No. 618—,,	4oin. ,,	.. .. .	..	12/-

Ash Printing Frames

Superior quality, selected material, best workmanship, suitable for work requiring the greatest accuracy, with removable bars, plate glass, and felt complete. The stands can be easily taken to pieces for transport or storage.

	Frames only			Stands		
	£	s.	d.	£	s.	d.
No. 621—25in. × 19in.	1	16	0	1	17	6
No. 622—32in. × 23in.	2	8	0	2	4	0
No. 623—42in. × 29in.	4	4	0	2	12	6
No. 624—54in. × 32in.	6	0	0			

Cheaper quality Frames and Stands can be supplied to order.

Water Baths

Zinc Baths, with brass chain and plug.						£	s.	d.
No. 625—26in. × 22in.						0	12	0
No. 626—32in. × 23in.						0	15	0
No. 627—42in. × 29in.						1	2	0
No. 628—54in. × 32in.						1	12	0

Acid Baths

Polished pine, lead lined, 4in. deep.						£	s.	d.
No. 631—32in. × 23in.						1	10	0
No. 632—42in. × 29in.						2	0	0
No. 633—54in. × 32in.						2	15	0

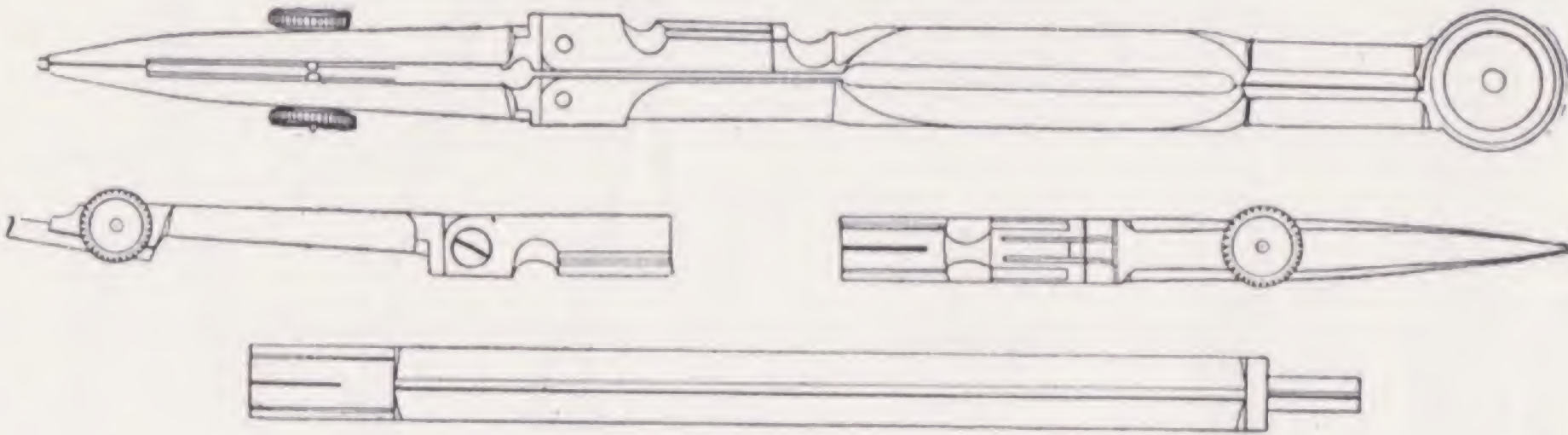
Stencil Plates (made in Copper)

Complete Sets of Alphabets—							
	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1 ins	
No. 641—Plain block letters	2/6	3/-	3/6	4/-	4/6	5/-	
No. 642—Ornamental : Roman, block, or Old English	—	4/3	4/9	5/6	7/-	8/-	
Words, per dozen letters—							
No. 643—Block	1/-	1/-	1/3	1/9	2/3	2/9	
No. 644—Ornamental : Roman, block, or Old English	—	2/3	3/6	3/9	4/3	5/6	
Figures, per set—							
No. 645—Plain	1/6	1/6	1/9	1/9	2/3	2/6	
No. 646—Ornamental : Roman, block, or Old English	2/-	2/-	2/3	2/6	3/6	4/-	
No. 647—Tree Plates					1/- to 4/-	each	
No. 648—North Points, Corners, Borders, &c.					1/- to 3/-	each	
No. 649—Stencil Inks						6d. and 1/-	
No. 650—Stencil Brushes					4d., 6d.,	and 1/-	
No. 651— Architects' complete sets of Stencils , containing ten sets Alphabets, six sets Figures, 48 various Plates, Ink and two Brushes, in mahogany box							
						£ s. d.	
						4 4	
No. 652— Engineers' complete sets of Stencils , containing ten sets Alphabets, six sets Figures, 40 various Plates, two Brushes and Ink, in mahogany box							
						4 4	

Drawing Instruments (Electrum)

Finest English make

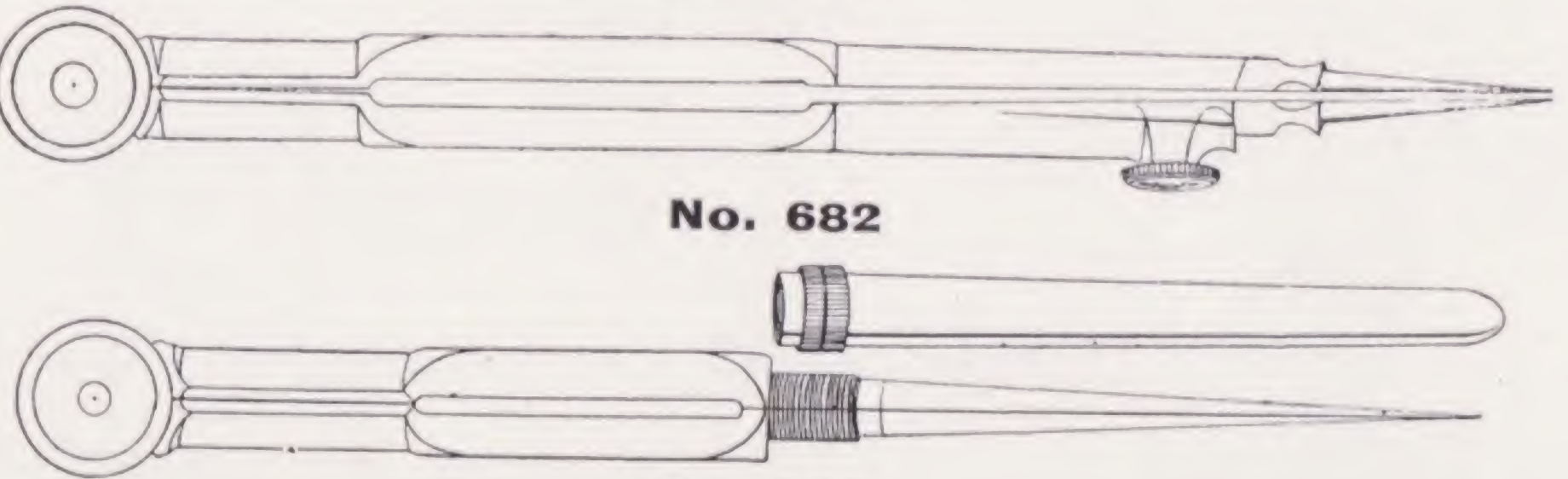
Half Sets of Compasses



No. 669

			Prices		
			£	s.	d.
No. 661—Sector Jointed, plain points, pen, and pencil points, lengthening bar and knife key	4½in. or 6in.		0	15	0
No. 662—Ditto do. extra quality	4½in. or 6in.		0	18	0
No. 663—Ditto do. with one knee joint	4½in. or 6in.		0	18	0
No. 664—Ditto do. extra quality	4½in. or 6in.		1	0	0
No. 665—Ditto do. with double joints	4½in. or 6in.		0	19	0
No. 666—Ditto do. extra quality	4½in. or 6in.		1	2	6
No. 667—Ditto do. with needle points	4½in. or 6in.		1	2	0
No. 668—Ditto do. extra quality	4½in. or 6in.		1	5	0
No. 669—Ditto do. with nut and bolt needle points	4½in. or 6in.		1	6	0
No. 670—Ditto do. extra quality	4½in. or 6in.		1	10	0
No. 671—Ditto do. with two lengthening bars	4½in. or 6in.		1	15	0
No. 672—Ditto do. extra quality	4½in. or 6in.		1	17	6

Dividers



No. 682

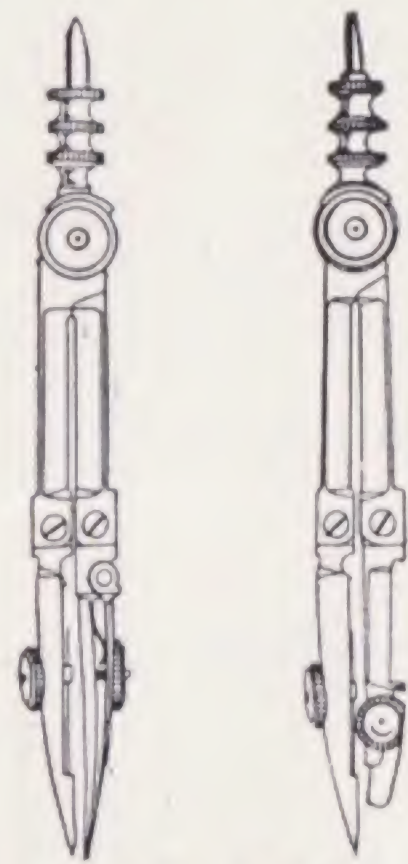
No. 685

No. 680—Sector Joint, plain points	4in. or 5in. each	0	4	0
No. 681—Ditto do. extra quality		0	4	6
No. 682—Ditto do. improved pattern hair spring	4in. or 5in. each	0	6	6
No. 683—Ditto do. extra quality		0	7	0
No. 684—Inside screw hair spring Dividers	4in. or 5in. each	0	9	0
No. 685—Pocket Dividers, with sheath to protect points, 4 sizes: 2½in., 3in., 3½in., or 4in. each		0	9	0

English Electrum Drawing Instruments—(Continued)

Proportional, Bisecting and Triangular Compasses

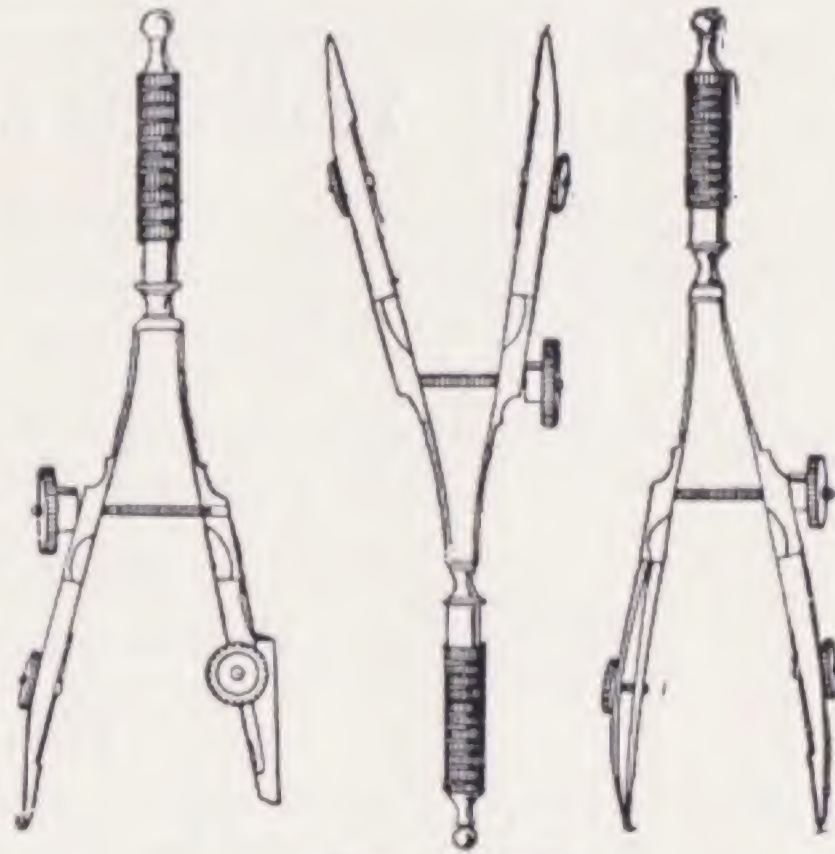
Finest English Make



Bow
Compasses

Spring
Bows

Finest Quality

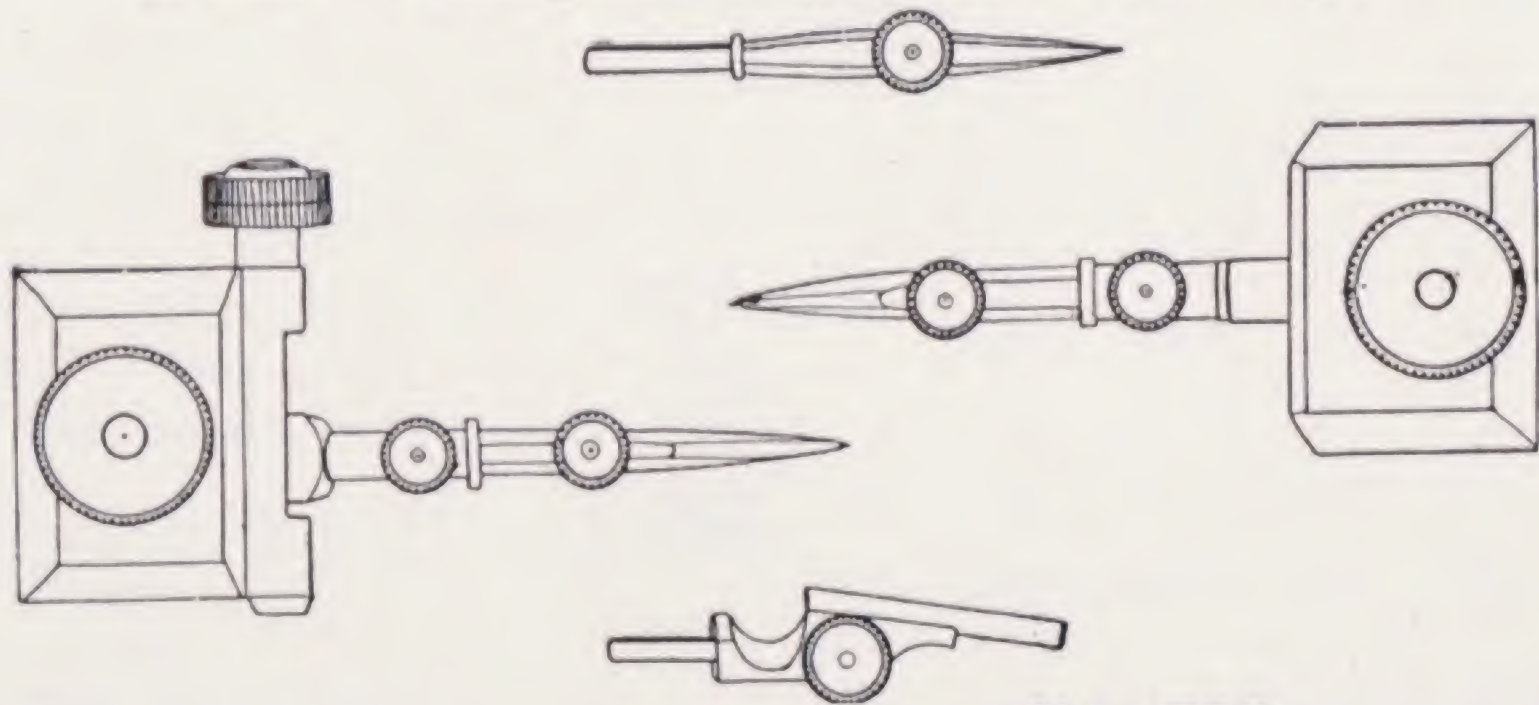


No. 693

No. 696

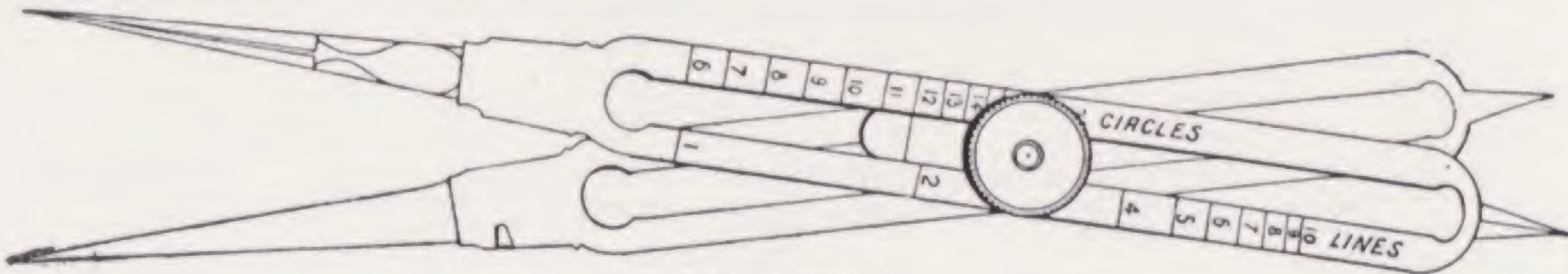
No. 690—Bows, improved pattern, pen or pencil, plain points	each	4/6
No. 691—Ditto do. double knee joints	"	8/-
No. 692—Bows, pen or pencil, double knee joint, clamped needle point ..	"	10/-
No. 693—Ditto do. nut and bolt needle points, double knee joints ..	"	11/-
No. 694—Spring bows, set of three, pen, pencil and dividers, plain points, Electrum handle, 2½ in. and 3 in., in case	per set	11/-
No. 695—Ditto do. clamped needle points	"	16/-
No. 696—Ditto do. nut and bolt needle points	"	17/-

Beam Compasses (Finest Quality)



No. 702

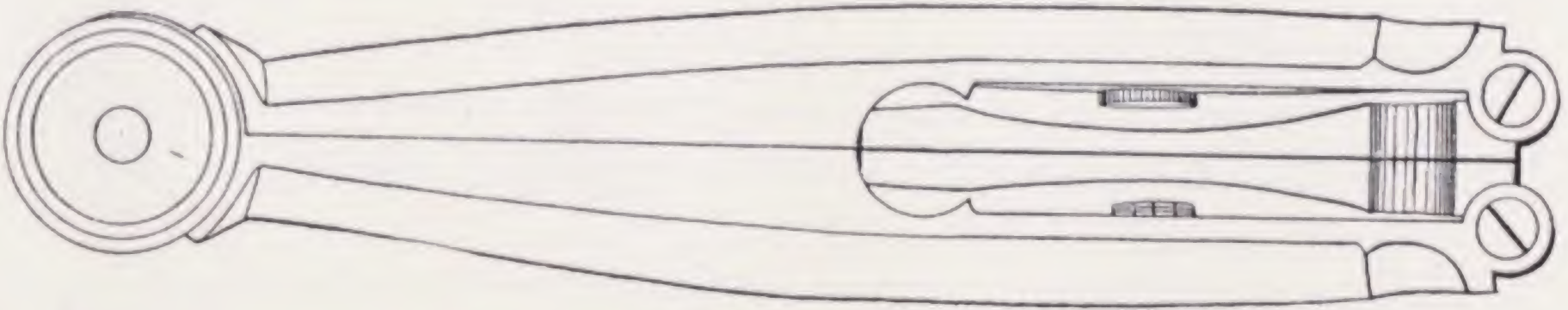
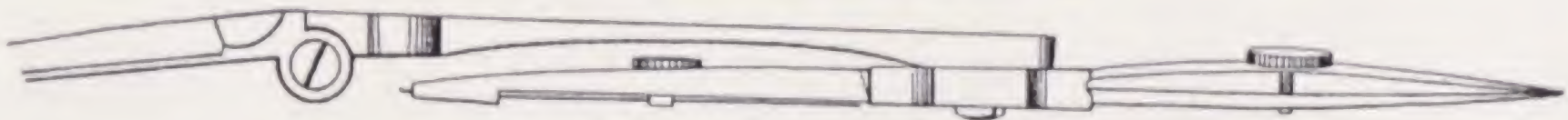
No. 700—Beam Compasses, Electrum, to fit any lath. Two plain points, pen and pencil points, with fine adjustment, in morocco case	£	s.	d.
No. 701—Ditto do. with clamped needle points	0	17	6
No. 702—Ditto do. with nut and bolt needle points	1	1	0
No. 703—Bars for above, hardwood, 36 in., 1/-	1	2	6
No. 704—Bars for above, hardwood, 36 in., 1/-	0	2	3



No. 706

		Price		
		6 in.		
		£	s.	d.
No. 705—Proportional Compass, Electrum, divided for lines, in case		0	16	0
No. 706—Ditto do. lines and circles, in case		1	5	0
No. 707—Ditto do. fully divided lines and circles, bar adjustment		1	12	6
No. 708—Wholes and Halves or Bisecting Compass		£1	0	0
No. 709—Triangular Compass with movable bar		0	18	0

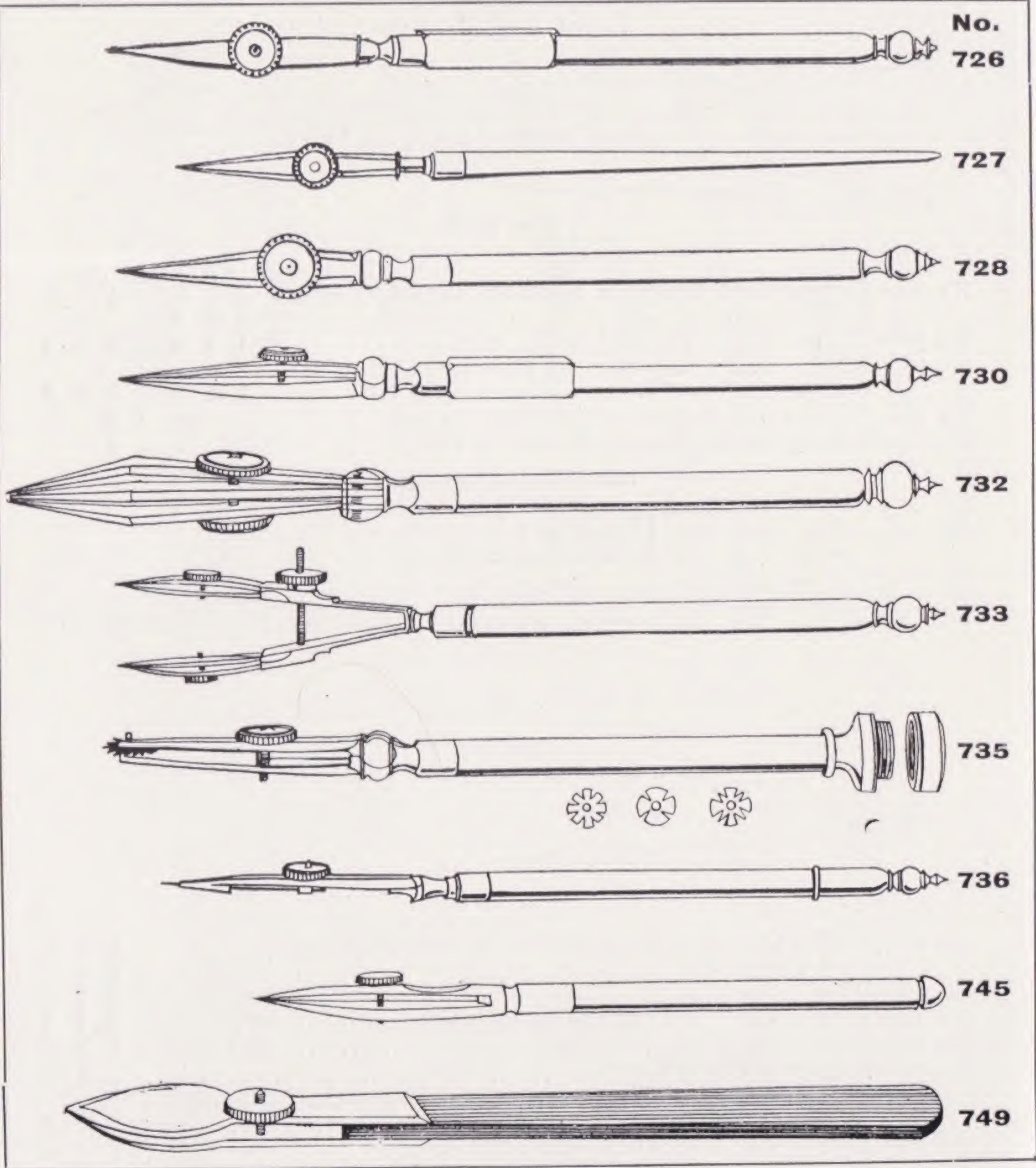
Pocket Compasses



No. 715

No. 712—Napier Compass, pen and pencil points, plain points, extra quality	large size ..	£	s.	d.
No. 713—Ditto do.	medium size	1	2	0
No. 714—Ditto do. nut and bolt needle points	large size ..	1	0	0
No. 715—Ditto do.	medium size	1	7	6
No. 716—Napier Dividers only		1	5	0
No. 717—Pillar Compass, forming pocket set of instruments, ink and pen points, draw-out, in morocco case		0	15	0
No. 718—Ditto do. with lengthening bar		1	10	0
No. 719—Pillar Divider, with two plain steel points		1	17	6
No. 720—Pillar Divider, with two plain steel points		0	10	6

Ruling Pens



See Page 99

Ruling Pens, etc.

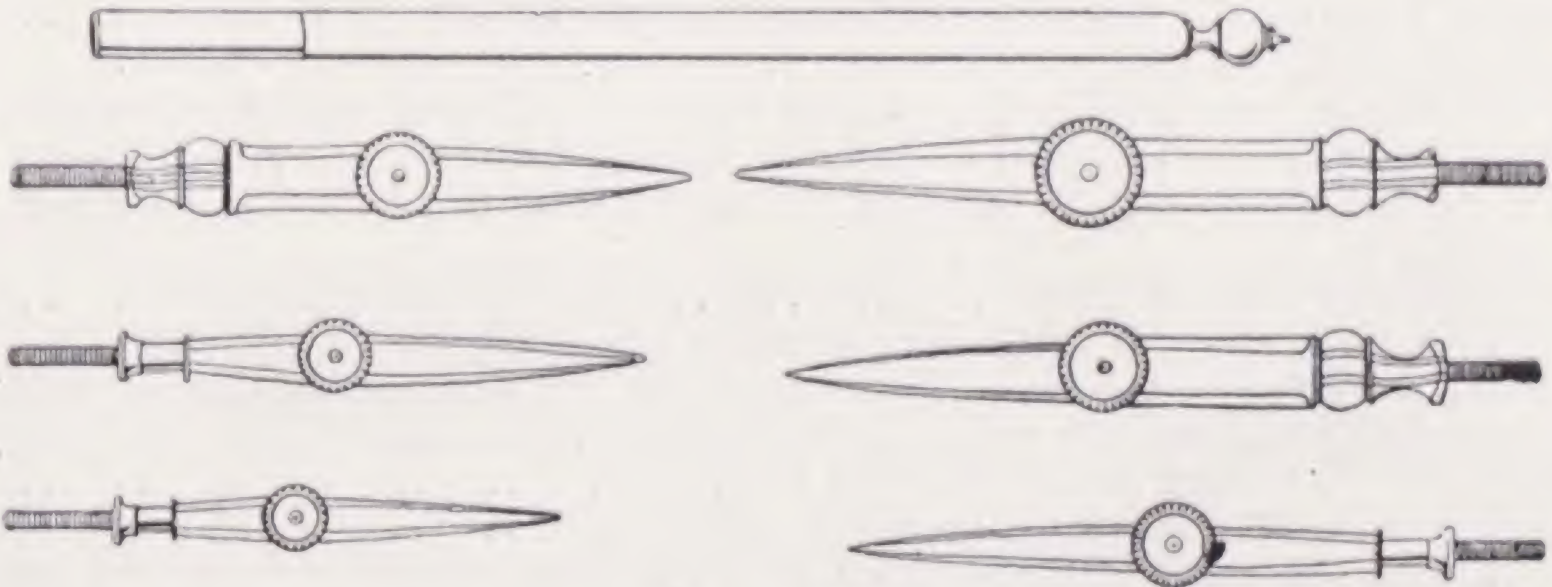
Finest English Make

No. 725—Solid Steel, Fine-line Ruling Pen, ivory handle, extra stout back nib	4½ in. or 6 in.	2/-
No. 726—Ditto do. square ivory handle	4½ in. or 6 in.	2/6
No. 727—Extra-fine Engineering Pen, solid steel, ivory taper handle	4½ in. or 6 in.	2/6
No. 728—Best Ivory Handle Hinged Ruling Pen	4½ in. or 6 in.	4/-
No. 729—Ditto do. square ivory handle	4½ in. or 6 in.	4/3
No. 730—Best-finished hinged Ruling Pen, with solid steel upper nib and extra stout back, sq. ivory handle	4½ in. or 6 in.	6/-
No. 731—Red-ink Ruling Pen, hinged, red ivory handle, electrum nib	6½ in.	2/6
No. 732—Border Pen, for broad lines, ivory handle	6½ in.	5/-
No. 733—Railroad or Double-line Ruling Pen, ivory handle .. .. .	.. .. .	7/-
No. 734—Ditto do. Pencil .. .. .	.. .. .	7/6
No. 735—Dotting Pen, with four wheels, ivory handle .. .. .	.. .. .	7/6
No. 736—Pricker, with nut and bolt to hold needle; reserve of spare needles .. .. .	.. .. .	2/3

Swiss and German Make

No. 741—Ruling Pen, bone handle, hinged	4 in., 4½ in., and 5 in.	1/6
No. 742—Do. do. Pricker	4½ in.	2/3
No. 743—Do. do. do.	5 in.	2/6
No. 744—Do. do. do.	5½ in.	2/9
No. 745—High-grade Upper Spring Blade Ruling Pen	4½ in.	3/-
No. 746—Do. do.	5 in.	3/3
No. 747—Do. do.	5½ in.	3/6
No. 748—Detail Pen, flat ebony handle	6 in.	3/-
No. 749—Do. extra broad	6 in.	3/-

Set of Steel Ruling Pens (Finest English Make)



No. 750

No. 750—Set of Six Steel Pens and One Handle, in case; three lift-up nibs, and three fine-line pens; solid steel, morocco case	per set	19/6
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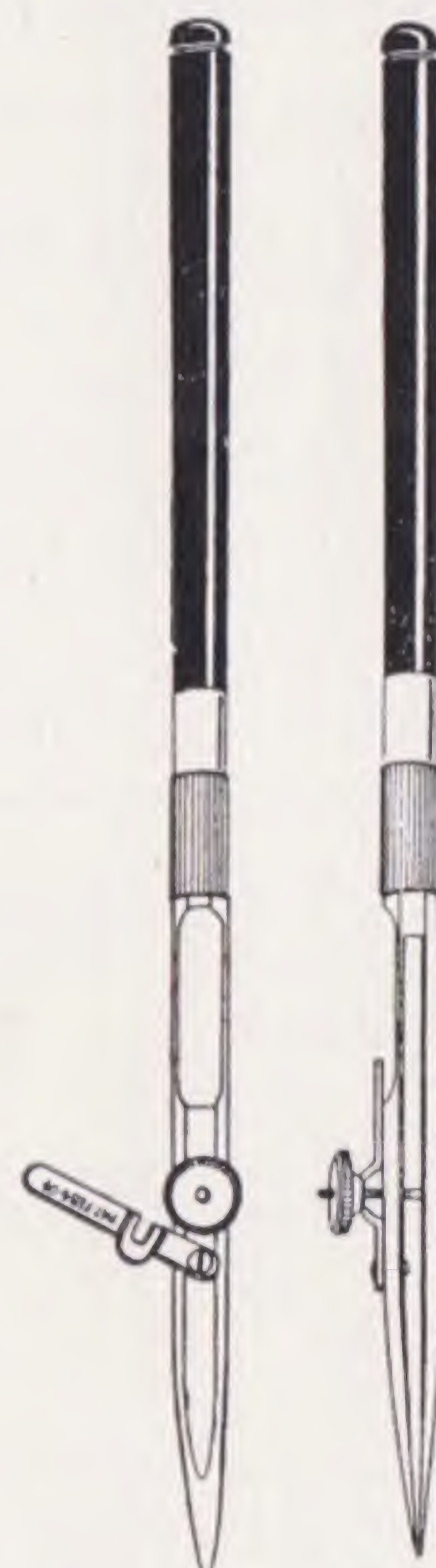
Special Ruling Pens, &c.



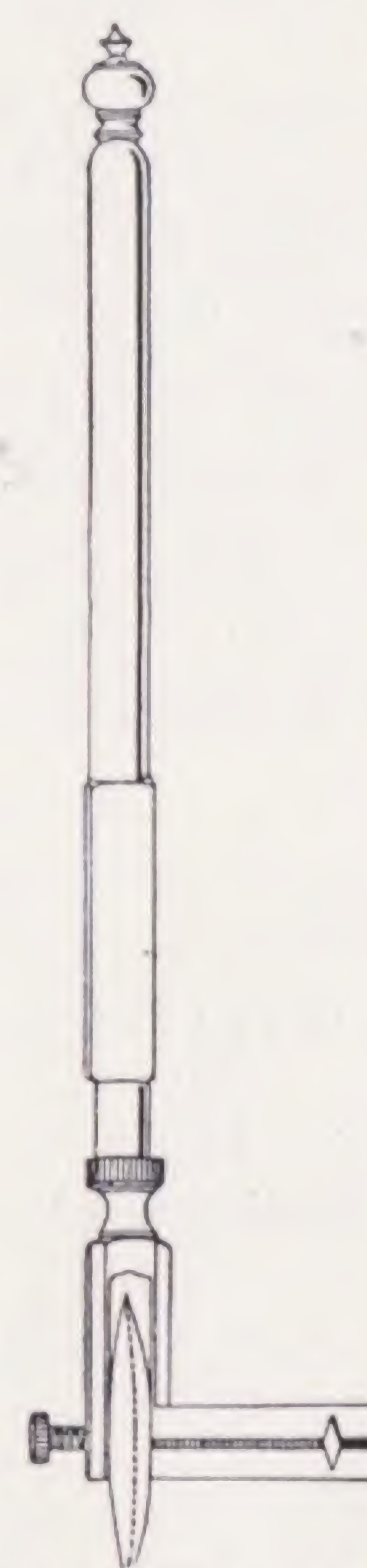
No. 755



No. 756



No. 759



Nos. 760-761

No. 755—Ruling Pen, ebony handle, graduated thumb screw, 5½ in. 6/6

No. 756—Improved Curve Pen 3/-

Through the handle of this Pen runs a small rod and the blades turning easily upon it, will follow the smallest curve. By tightening a small nut at the top of the Pen it may then be used as an ordinary Drawing Pen.

No. 757—Improved Railroad Pen 8/6

The construction of this Pen is the same as above, except that it has two pairs of blades. The heads of the screws in the blades are graduated to secure uniform thicknesses.

No. 758—High grade, spring hinge, Ruling Pen, 5½ in. 5/-

No. 759—High grade, spring hinge, lever blade, 5½ in. 5/-

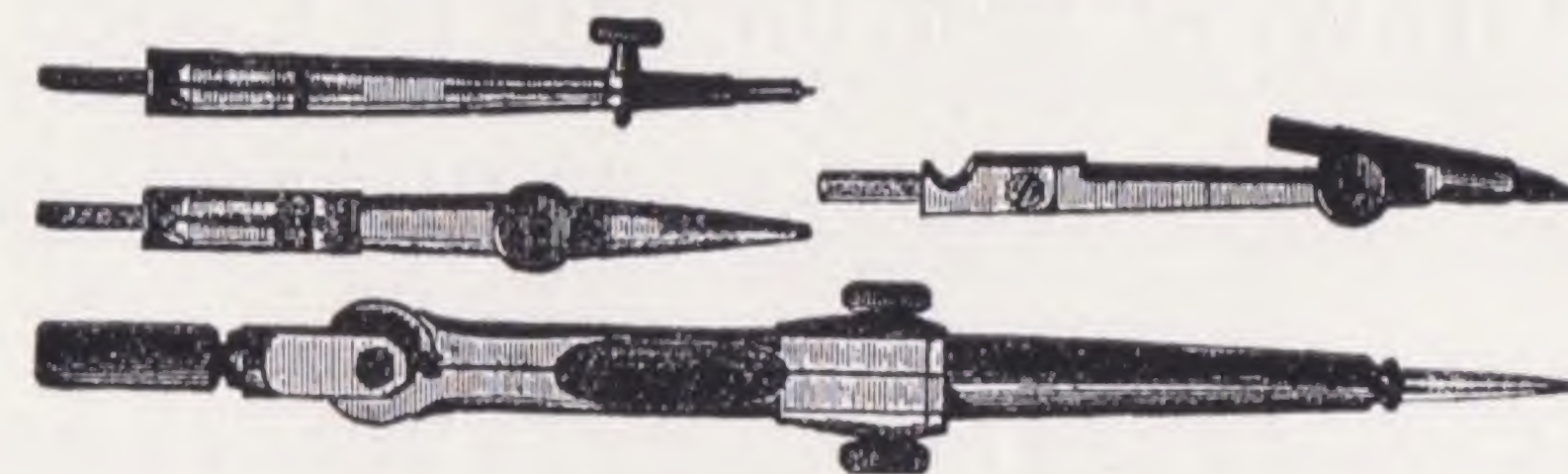
These Pens are fitted with an arrangement whereby they can be cleaned without altering the adjustment. Specially adapted for ruling fine lines.

No. 760—Opisometer, for measuring curved lines. Best English make. 4/-

Ivory handle

No. 761—Opisometer, fully divided inches and roths 12/-

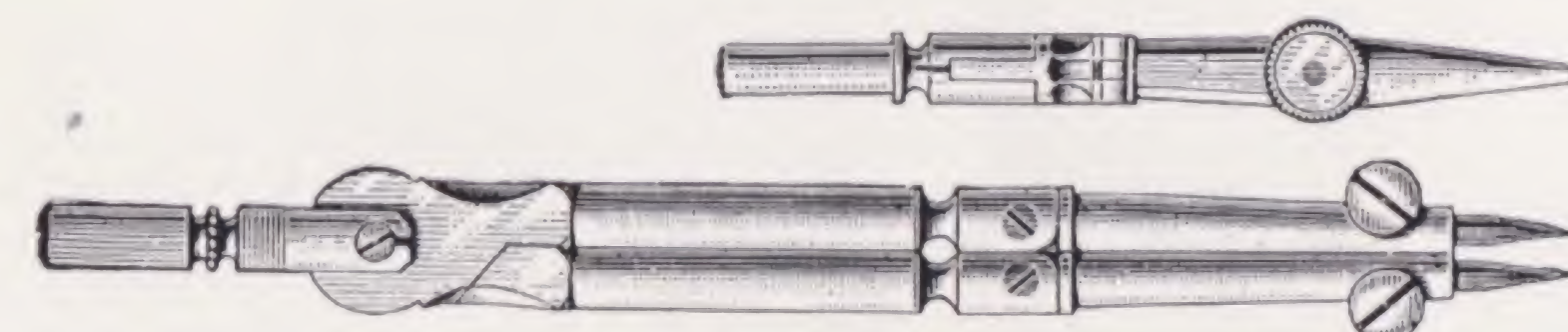
Swiss Instruments



No. 766

	Price
No. 766—Half set, containing 3½ in. compass, detachable divider points, needle points, pen and pencil points, box of leads and key (not in case)	6/6
No. 767—Half set as above, but full size 5½ in. compass, all attachments and lengthening bar, leather pocket case	10/6

Tubular Half Sets



No. 768

No. 768—Half set, consisting of 3½ in. compass, with needle, pen and pencil points	9/6
No. 769—Half set, consisting of 5½ in. compass, needle, pen and pencil points and lengthening bar	10/-

Rotating Compasses



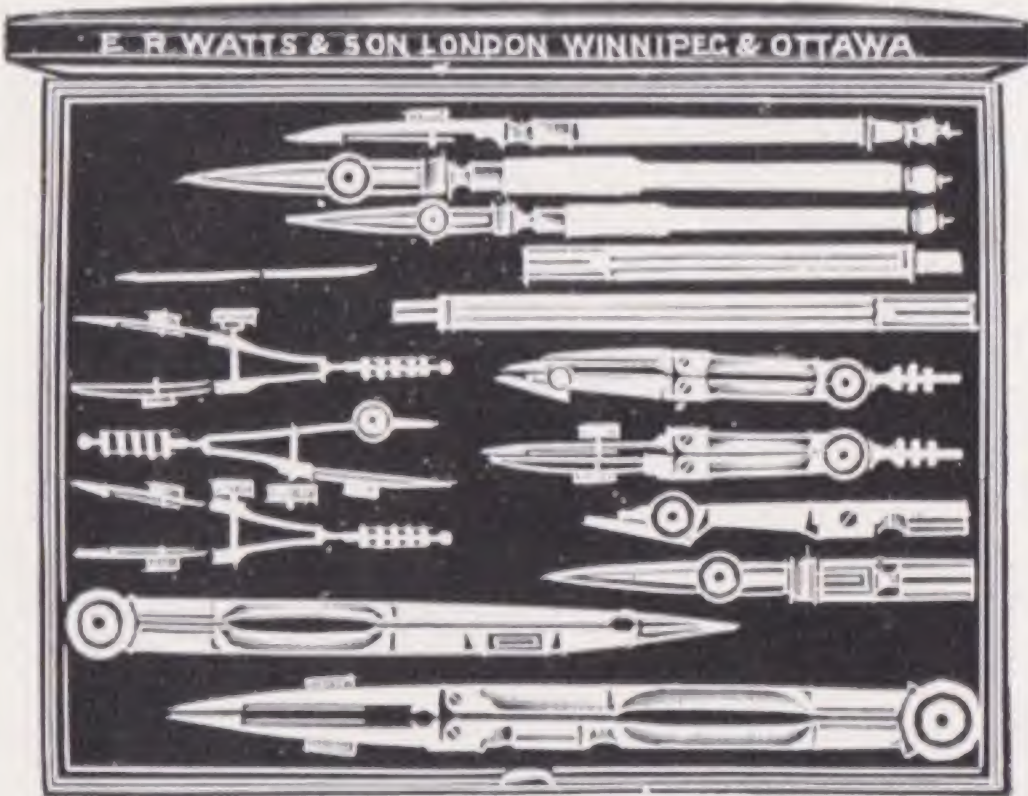
No. 776

No. 775—Rotating Compass (electrum), pen point only	6/6
No. 776—Ditto do. do. pen and pencil points	8/6
No. 777—Cases for the above	1/-

Drawing Instruments in Cases

Magazine Cases, of solid oak and walnut, containing the finest quality English-made Drawing Instruments and Sundries. Supplied to order from £5 to £20.

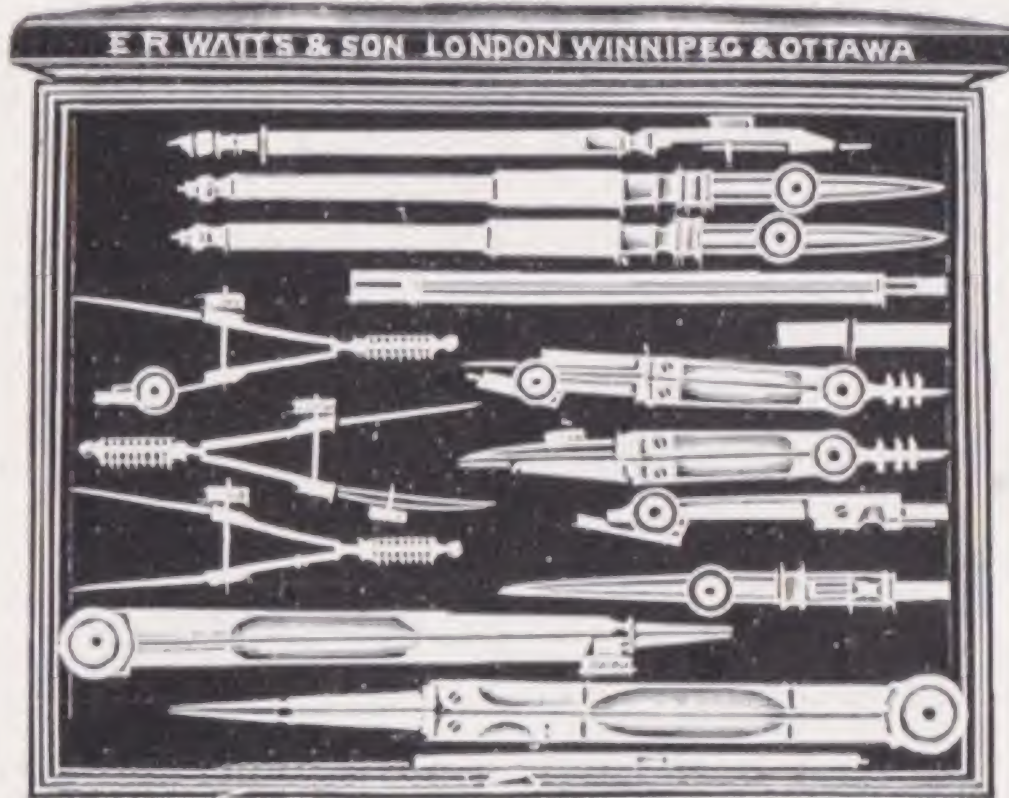
Pocket Cases of Finest English-made Electrum Instruments



No. 790

	Price £ s. d.	Code Word
No. 790—Russia leather case, with extra quality nut and bolt needle point electrum instruments, containing 4½in. half-set compasses, double knee joint, pen and pencil points, two lengthening bars No. 672, hair-spring divider No. 683, bow pen and pencil, double knee joint, No. 693, set of three spring bows No. 696, two drawing pens, one fine line ruling pen, square ivory handle, one with solid steel upper nib, square ivory handle, Nos. 726 and 730, improved pricker No. 736, knife key and bow key	4 15 0	Lias
No. 791—Ditto 6in. set	5 0 0	Liber
No. 792—Morocco case, with extra quality electrum instruments, containing 4½in. half-set compasses, needle points, pen and pencil points lengthening bar No. 668, hairspring divider No. 683, bow pen and pencil, double knee joints, clamped needle points, No. 692, three spring bows, pen, pencil, and divider, No. 695, two drawing pens, one fine line ruling pen, ivory handle, one hinged ivory handle ruling pen, Nos. 725 and 730, knife key and bow key	4 2 6	Lieu
No. 793—Ditto 6in. set	4 7 6	Limb

Pocket Cases of Instruments—(Continued)
Best English Make (Electrum)



No. 795

	Price £ s. d.	Code Word
No. 795—Morocco case, with extra quality instruments, containing 4½in. half-set compasses, pen and pencil points, double knee joint, lengthening bar No. 666, hair-spring divider No. 683, bow pen and pencil, round points, double knee joints No. 691, set of three spring bows, pen, pencil, and divider No. 694, two drawing pens, one fine line square ivory handle, one hinged square ivory handle Nos. 726 and 730, pricker, with nut and bolt needle point No. 736, knife key and bow key	3 15 0	Lift
No. 796—Ditto 6in. set	4 0 0	Ligan
No. 797—Morocco case, with best quality instruments, containing 4½in. half-set compasses, pen and pencil points, double knee joints, nut and bolt needle points, lengthening bar No. 669, hair-spring divider No. 682, bow pen and pencil, nut and bolt needle points, double knee joints No. 693, one drawing pen, hinged blade, square ivory handle No. 730, knife key and bow key	3 10 0	Likeness
No. 798—Ditto 6in. set	3 15 0	Likely
No. 799—Morocco case, with best quality instruments, containing 4½in. half-set compasses, pen and pencil points, double knee joints, clamped needle points, lengthening bar No. 667, hair-spring divider No. 682, bow pen and pencil, double knee joints, clamped needle points No. 692, one drawing pen, hinged blade, square ivory handle No. 730, knife key and bow key.. .. .	3 5 0	Liken
No. 800—Ditto 6in. set	3 7 6	Lilac
No. 801—As No. 799, but with plain points, 4½in. set	2 17 6	Lilt
No. 802—Ditto 6in. set	3 0 0	Limber

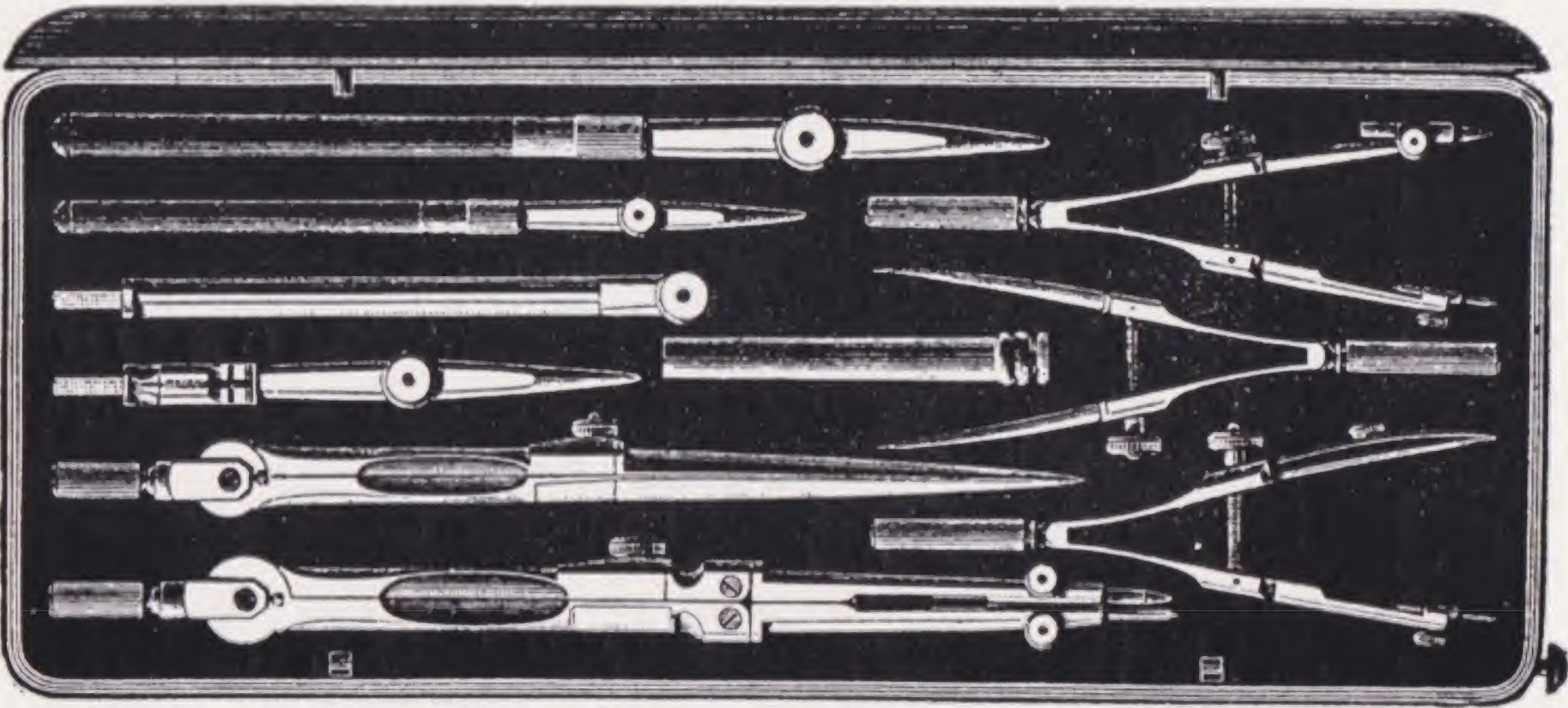
Pocket Cases of Instruments—(Continued)

Best English Make (Electrum)

	Price £ s. d.	Code Word
No. 805—Morocco case, with best quality instruments, containing 4½in. half-set compasses, pen and pencil points, double knee joints, nut and bolt needle points, lengthening bar No. 669, hair-spring divider No. 682, set of three spring bows, nut and bolt needle points No. 696, drawing pen, hinged blade, square ivory handle No. 730	3 5 0	Linen
No. 806—Ditto 6in. set	3 10 0	Link
No. 807—As No. 805, but with clamped needle points.. .. .	3 0 0	Lintel
No. 808—Ditto 6in. set	3 2 6	Lisbon
No. 809—As No. 805, but with plain points	2 15 0	Listen
No. 810—Ditto 6in. set	2 17 6	Litany

Finest Grade Swiss Drawing Instruments

Rolled German silver, with best English steel joints and points, pivot head joints, morocco leather cases, silk plush lined, German silver hinges, and bar lock.



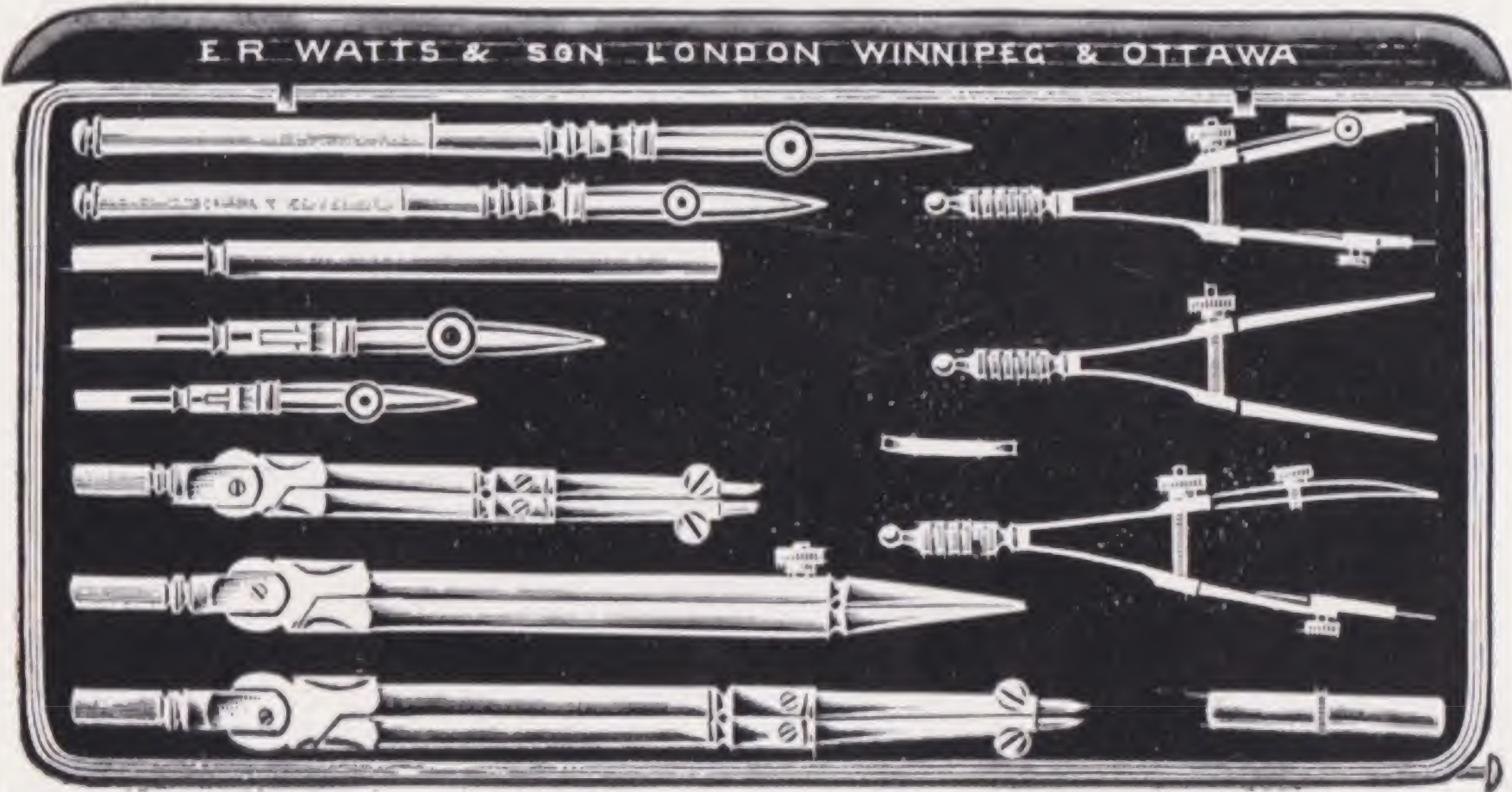
No. 820

No. 820—Case consisting of 5½in. compass, with needle points, detachable pen and pencil points, lengthening bar, 5in. hair-spring divider, two spring ruling pens, 4½in., 5½in. Full set of three spring bows, box of leads and key	£ s. d. 1 15 0	Lock
No. 821—Case consisting of 5½in. compass, with fixed needle points, detachable pen and pencil points, 3½in. compass, with fixed needle and detachable pen and pencil points, lengthening bar, 5½in. hair-spring divider, three spring ruling pens, 4½in., 5in., 5½in., full set of three spring bows, box of leads and key	2 10 0	Lode

Finest Quality German Instruments

Tubular-pattern instruments, in leather cases, lined silk velvet, bar lock.

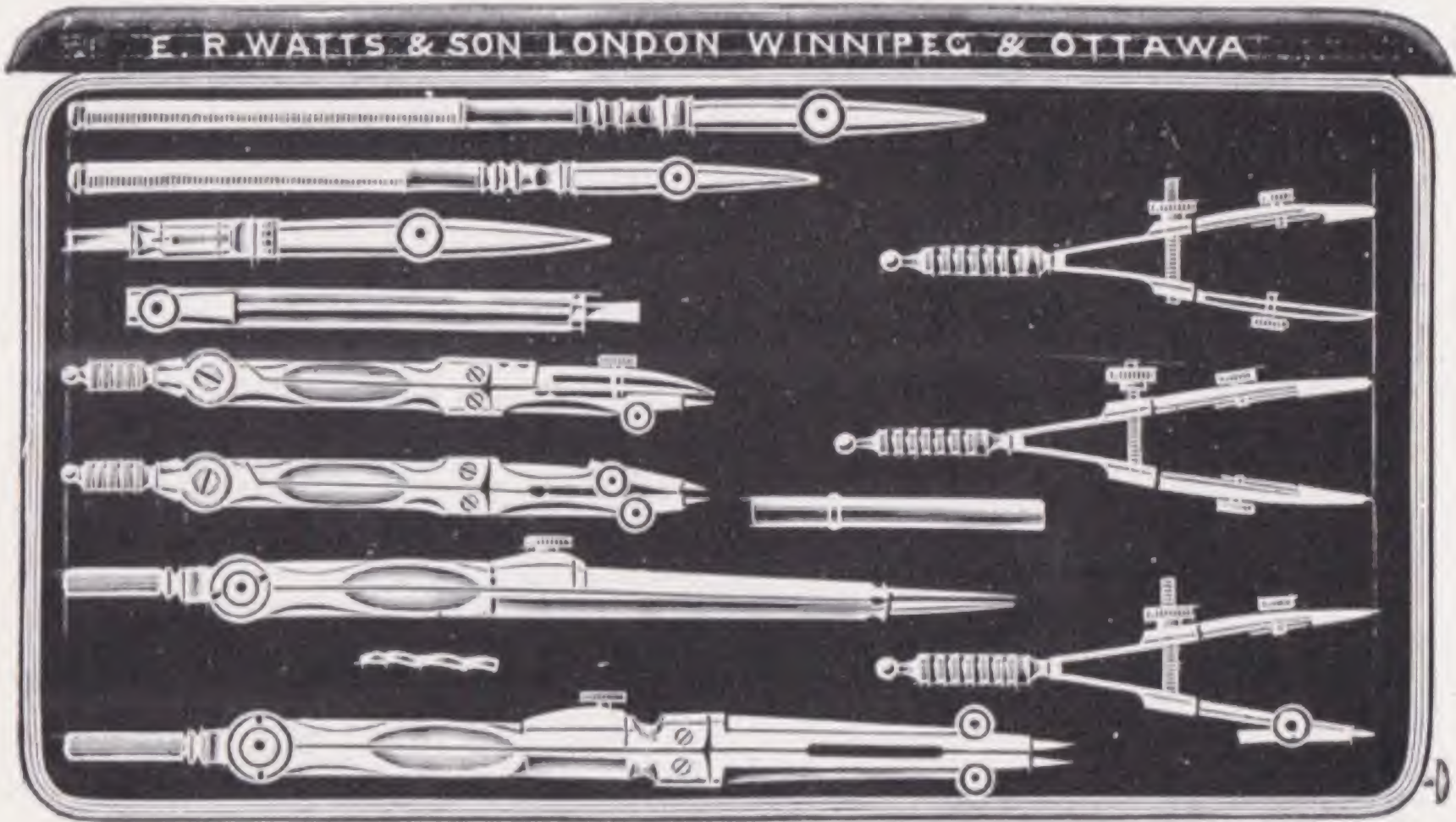
All the joints and points are of the finest hard steel.



No. 828

	Price £ s. d.	Code Word
No. 825—Set consisting of 5½in. compass, detachable needle, pen and pencil points, lengthening bar, 5in. divider, 5½in. hinged ruling pen with ivory handle, box of leads	0 17 6	Loft
No. 826—Set consisting of 5½in. compass, detachable needle, pen and pencil points, lengthening bar, set of three spring bows, 5in. divider, 5½in. hinged ruling pen with ivory handle, box of leads	1 5 0	Logos
No. 827—Set consisting of 5½in. compass, detachable needle, pen and pencil points, lengthening bar, set of three spring bows, 5in. hair-spring divider, two ruling pens with ivory handle, box of leads	1 10 0	Look
No. 828—Set consisting of 5½in. compass, detachable needle, pen and pencil points, lengthening bar, 3½in. compass with needle, pen and pencil points, set of three spring bows, 5in. hair-spring divider, 5½in. and 4½in. hinged ruling pens with ivory handle, box of leads.. .. .	1 15 0	Loom

High-class German Instruments

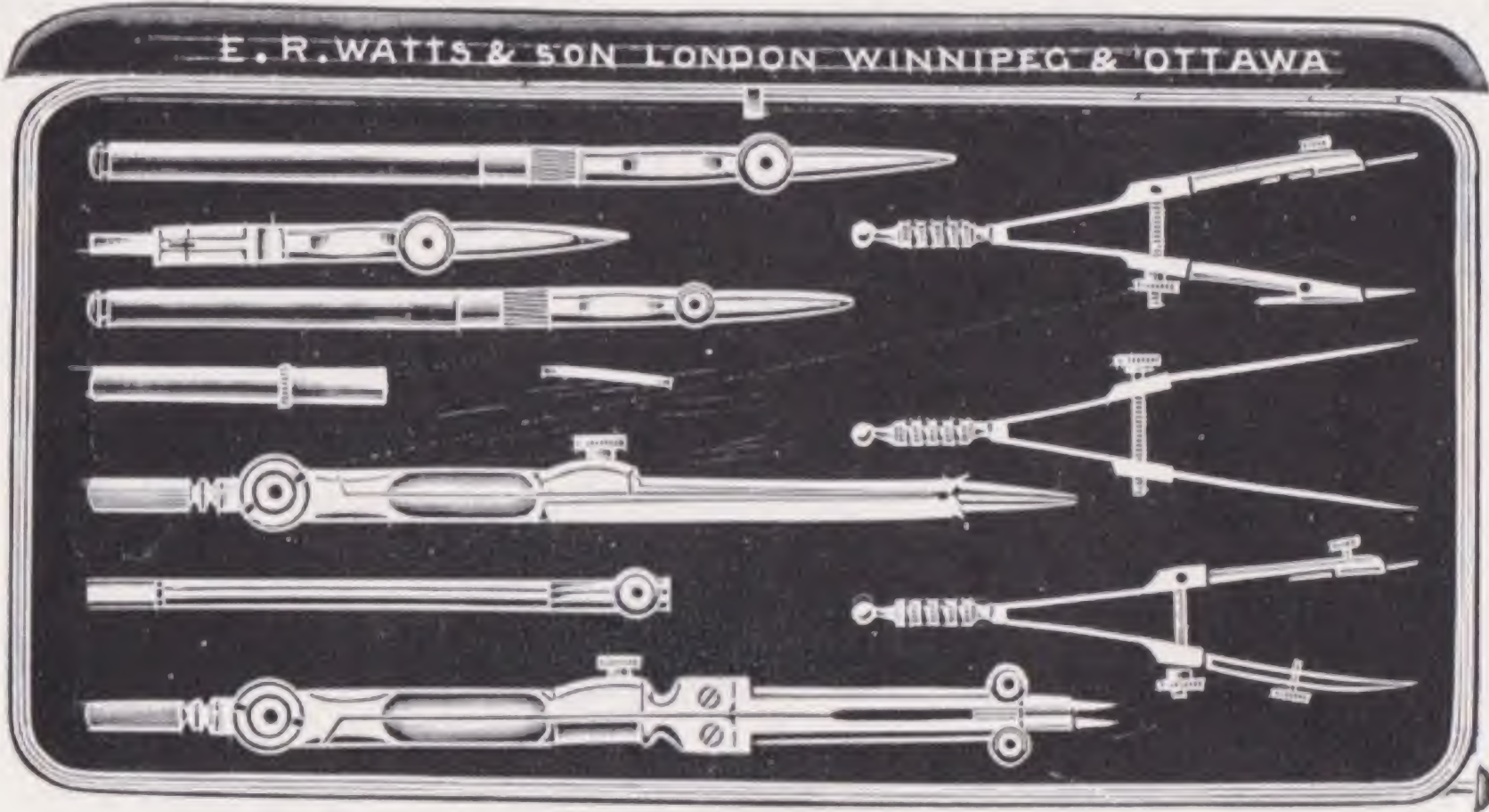


No. 833

Electrum, with hard steel points, patent ball and socket lead joints, steel joints throughout. Leather covered cases, velvet lined.

	Price	Code Word
	£ s. d.	
No. 830—Case containing 5½in. compass, knee joints, fixed needle points, pen and pencil points, lengthening bar, 5in. divider, hinged ruling pen with ivory handle, steel spring bow pen with needle point, box of leads	0 15 0	Loose
No. 831—Case containing 5½in. compass, knee joints, fixed needle points, pen and pencil points, lengthening bar, 5in. hair-spring divider, set of three spring bows, two ruling pens (4½in., 6in.), box of leads.. .. .	1 5 0	Lost
No. 832—Case containing 5½in. compass, knee joints, fixed needle points, pen and pencil points, lengthening bar, 5in. hair-spring divider, 3½in. compass, pen and pencil points, set of three spring bows, two ruling pens (4½in., 6in.), box of leads	1 12 6	Loth
No. 833—Case containing 5½in. compass, knee joints, fixed needle points, pen and pencil points, lengthening bar, 5in. hair-spring divider, bow pen and bow pencil, set of three spring bows, two ruling pens (4½in., 6in.), box of leads ..	1 15 0	Lotus

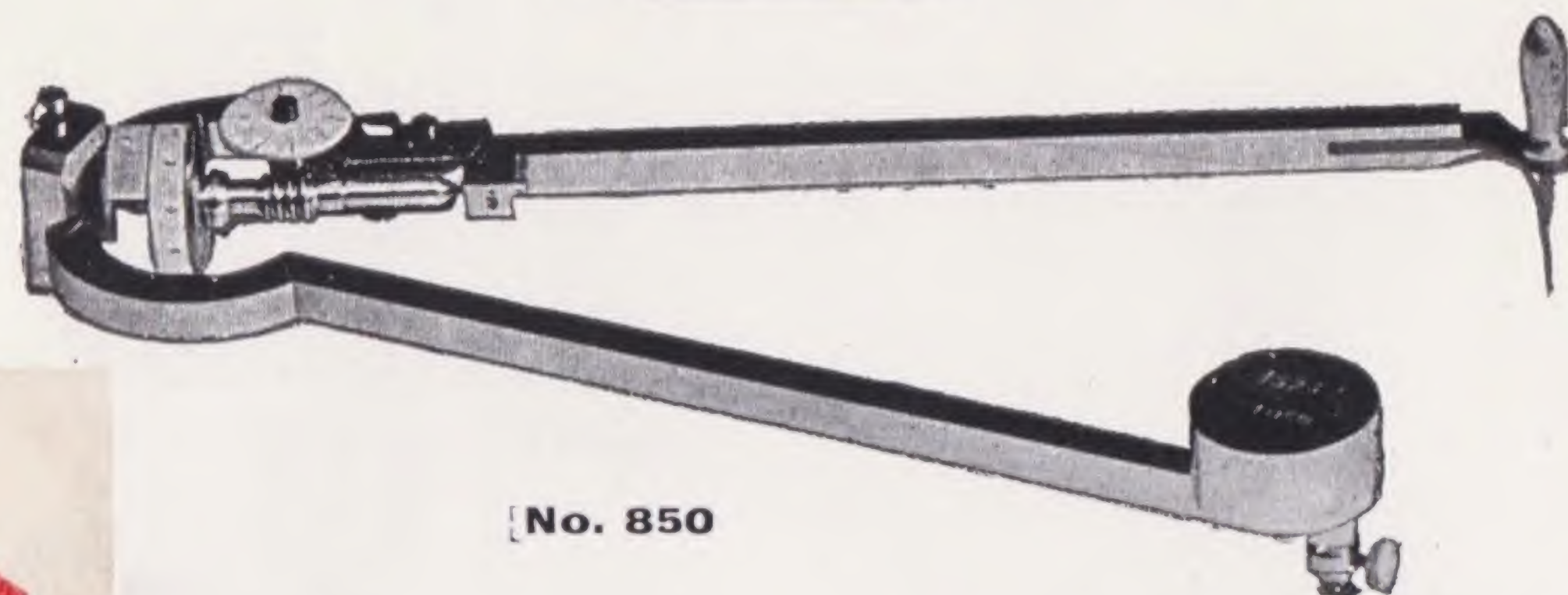
School Instruments



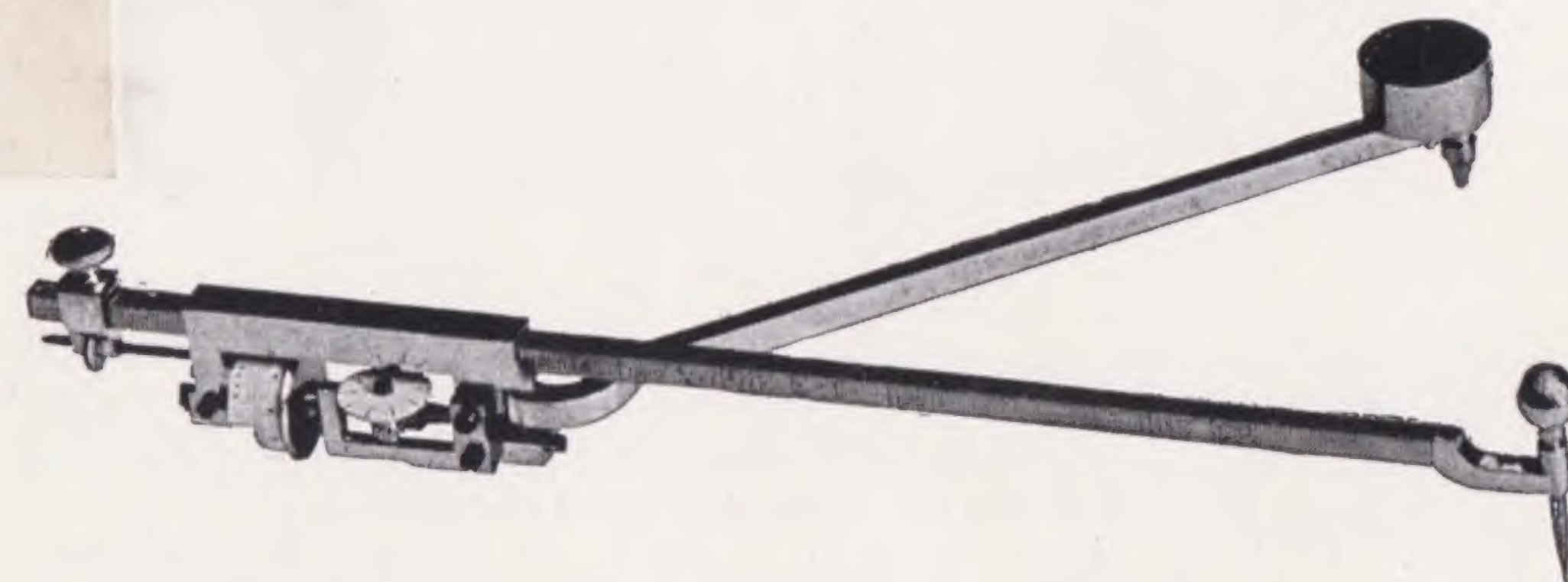
No. 841

	Price	Code Word
No. 835—Case containing 5½in. compass, with pencil points, pen points, 5in. ruling pen, box of leads and key	4/6	Lough
No. 836—Case containing 5½in. compass, with pencil point, pen point, lengthening bar, 5in. ruling pen, box of leads and key	5/-	Lunar
No. 837—Case containing 5½in. compass, with pencil points, pen points, lengthening bar, spring bow pen, 5in. ruling pen, box of leads and key	7/6	Lunate
No. 838—Case containing 5½in. compass, with pencil points, pen points, lengthening bar, 5in. divider, 5in. ruling pen, box of leads and key	7/6	Lunette
No. 839—Case containing 5½in. compass, with pencil points, pen points, lengthening bar, 5in. divider, spring bow pen, 5in. ruling pen, box of leads and key	10/-	Luted
No. 840—Case containing 5½in. compass, with pen and pencil points, lengthening bar, 5in. divider, spring bow pen, spring bow pencil, spring bow divider, 5in. ruling pen, box of leads and key	12/-	Luthern
No. 841—Case containing 5½in. compass, with pen and pencil points, lengthening bar, hair-spring divider, spring bow pencil, spring bow pen, spring bow divider, 5in. ruling pen, 4½in. ruling pen, box of leads and key	15/-	Lydian

Planimeters



No. 850



No. 851

	Price	Code Word
No. 850— Amsler's Planimeter , fixed index, reading to square inches. Range of circle 18in. diameter, in German silver, complete in morocco case	£2 2 0	Lead
No. 851— Amsler's Planimeter , range of circle 24in. diameter with sliding bar divided to various scales, both English and metric. Best quality in German silver, morocco case	2 12 6	Leader
No. 852— Amsler's Roller Planimeter , with rollers working on a revolving disc correcting irregularities, made in German silver, complete in case	8 15 0	Leading

The Planimeters mentioned above are those mostly used, and are of the best quality. Cheaper styles can be furnished, but are not stocked. Prices sent on application.

Integrators

Amsler's Integrator, with three recording mechanisms, giving the area, moment, and moment of inertia of a figure; two gauges for adjusting instrument to axes of moment; two tracing points. Complete in hardwood case. Grooved steel rail, 59in. long, in separate case, with directions.

	Price £ s. d.	Code Word
No. 855—German silver	21 0 0	Lecher
No. 856—Brass	19 0 0	Lecton

Eidographs

Imperial Eidograph, working from equal size, decreasing to $\frac{1}{8}$ th size. Tubular construction, well finished, all accessories. Fitted into mahogany case.

No. 857—30in. size	13 0 0	Lector
No. 858—36in. size	15 0 0	Ledge

These instruments are very exact, and for many purposes superior to the pantagraph.

Pantagraphs

These instruments are extremely light and rigid, being of tubular metal construction. All necessary accessories are included, and the whole packed in mahogany case.

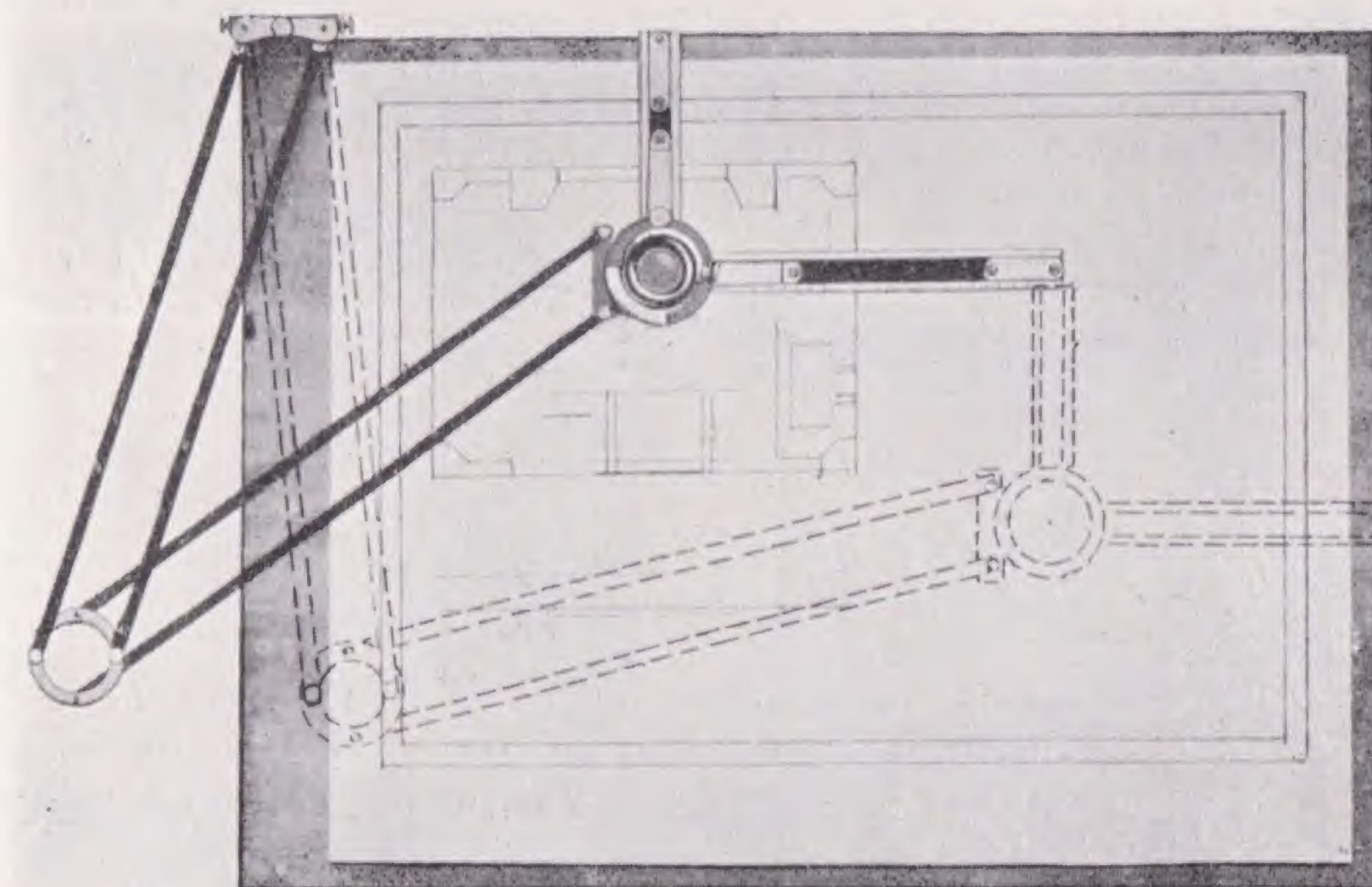
No. 861—18in.	7 0 0	Lees
No. 862—24in.	8 0 0	Leet
No. 863—30in.	9 0 0	Legal
No. 864—36in.	10 0 0	Legate

Pantagraphs (Wooden)

No. 866—Boxwood, 16in. long, divided, with holder and brass slots	0 10 0	Legion
No. 867—Ditto, new style, 20in., brass fittings.. .. .	0 12 6	Lemur
No. 868—Pearwood, suitable for students, 15in. long	0 3 0	Lenity
No. 869—Ditto do. best quality	0 4 0	Lenify

E. R. WATTS & SON

Universal Drafting Machine



No. 871

This machine consists of a graduated square, having an accurate parallel motion about the drawing board. Both blades of the square are graduated for drawing and measuring lines at the same time, thus dispensing with separate scales.

The parallel motion is obtained by means of two pivoted parallelograms, which constitute an arm joining the square to the board. This arm is flexible, allowing the scales to lie flat upon the paper. It is hinged at the connection to the board, and may be easily lifted out of the way of the paper. The square can be moved about on the board as easily as though it were not joined to the arm.

The square is arranged to swing to any angle, and is provided with a conveniently adjusted protractor. This enables the use of the triangle to be entirely dispensed with, and the angular work to be dealt with just as easily and rapidly as straight work.

Spring stops are provided at 30°, 45°, 60°, 90°, enabling the squares to be instantly set to these angles. For intermediate angles, the square can be clamped and set, and will remain parallel to itself in all positions.

The blades of the square fit into sockets, and are interchangeable. Any length of blade and any scale can be supplied as required.

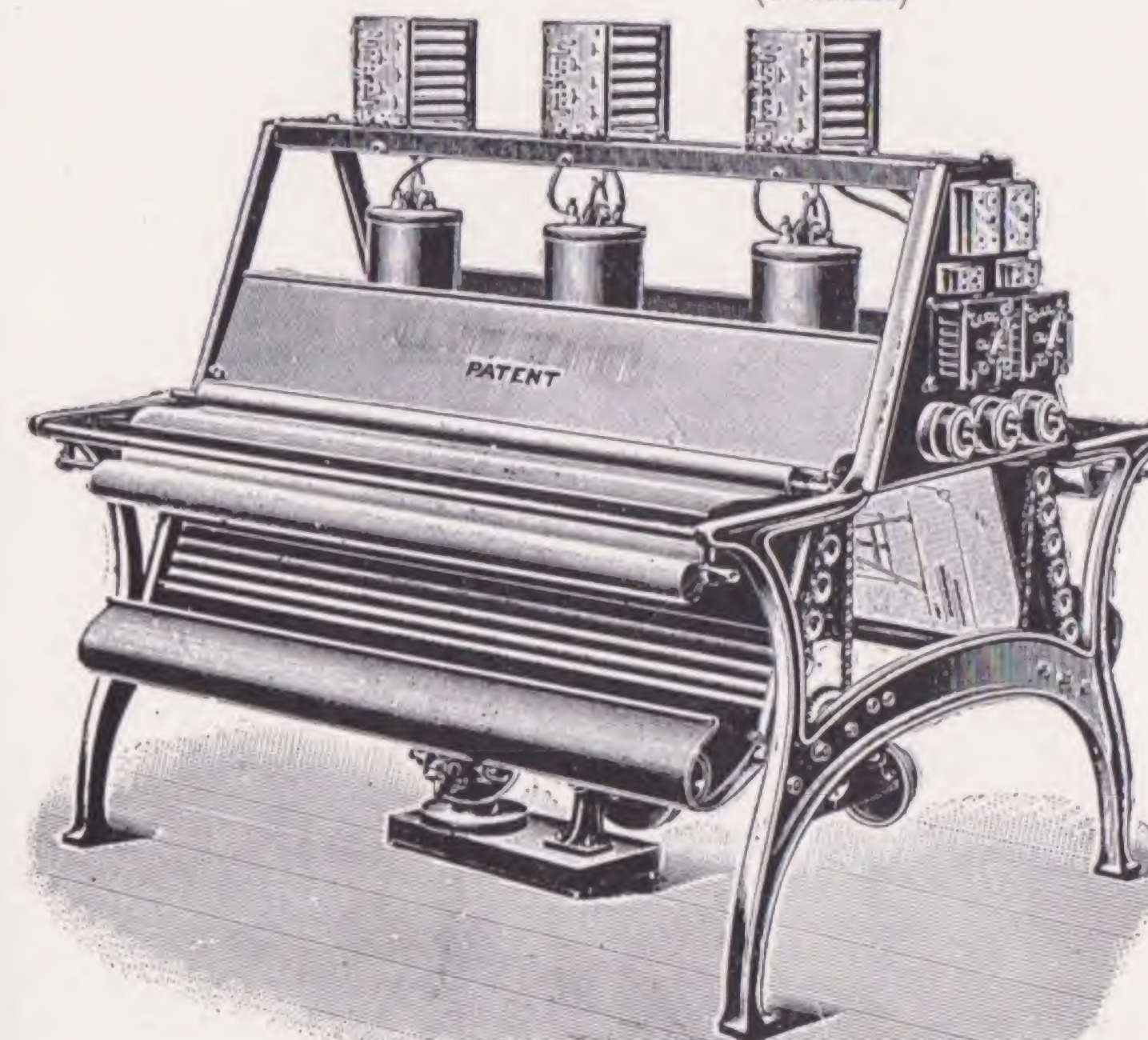
	Price	Code Word
No. 871—Universal Drafting Machine for drawings up to 18in. × 24in., with one 6in. and one 12in. scale, boxwood, white edges, graduated full length	£ s. d. 5 2 6	Laze
Extension Bar, which must be used if the full length of the drawing board is to be covered	0 2 6	

Prices for larger sizes quoted on application.

LONDON, OTTAWA & WINNIPEG

Continuous Electric Photo-copying Machine

(Patent)



Noiseless in working.

Exceedingly simple to operate.

Will reproduce tracings of any length.

Perfect contact throughout whole length of print.

The Double Pattern copies two continuous tracings at one time.

Double Pattern

Continuous Current 100 to 250 Volts

	Double Pattern	Single Pattern
No. 875—For tracings, 30in. wide..	£ s. d. 60 0 0	£ s. d. 42 0 0
No. 876—,, 40in. ,, ..	70 0 0	50 0 0
No. 877—,, 47in. ,, ..	78 0 0	58 0 0

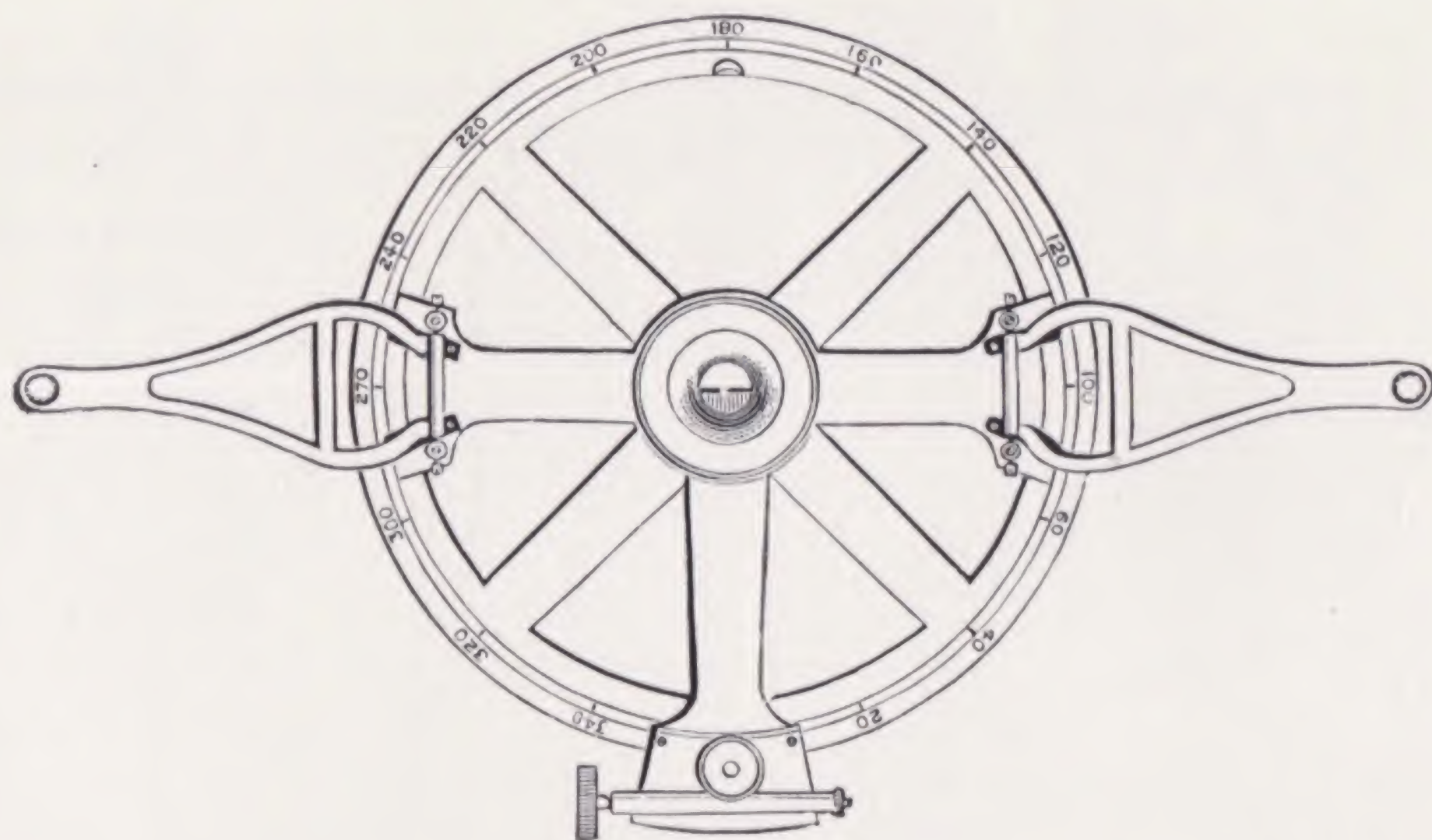
Alternating Current 100 to 250 Volts

	Double Pattern	Single Pattern
No. 878—For tracings, 30in. wide..	£ s. d. 80 0 0	£ s. d. 57 0 0
No. 879—,, 40in. ,, ..	90 0 0	65 0 0
No. 880—,, 47in. ,, ..	98 0 0	73 0 0

Approximate Floor Space

	Double Pattern	Single Pattern
30in Machine ..	48in. × 38in. ..	38in. × 36in.
40in. ,, ..	48in. × 48in. ..	48in. × 36in.
47in. ,, ..	48in. × 55in. ..	54in. × 36in.

Metal Protractors



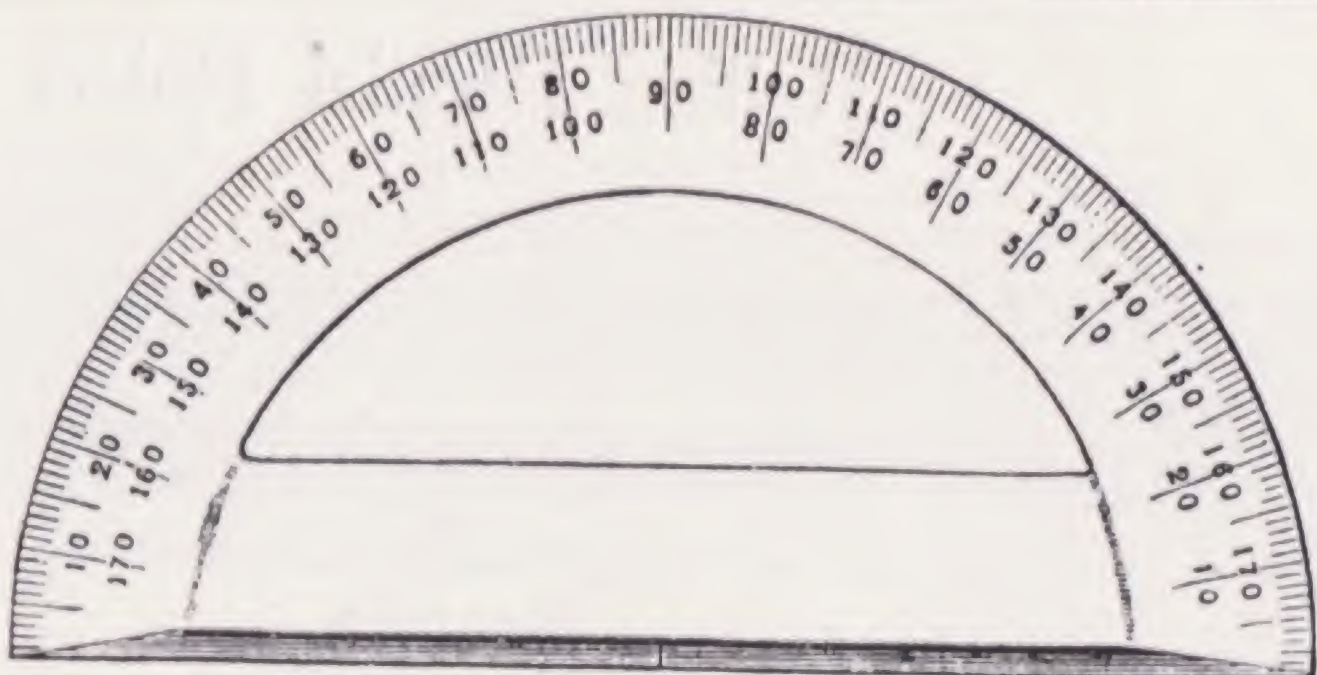
No. 885

Prices

Gun metal Electrum

		£ s. d.		£ s. d.	
No. 885—	Protractor, circular, 6in., divided on silver, reading to 1 minute by two verniers, with folding arms, clamp and tangent, in mahogany case	4	10	0	6 0 0
No. 886—	Ditto Semi-circular, 6in., with arm and vernier reading to 1 minute, in case	2	5	0	2 17 6
No. 887—	Ditto do. 9in.	3	2	6	3 17 6
No. 888—	Ditto Circular, 9in.	3	10	0	4 5 0
No. 889—	Ditto do. continental pattern, 8in. diam., divided to 1/4°, verniers reading to 1 minute. Arm extending to 6in. over the outside of circle	—			2 15 0
No. 890—	Ditto, Semi-circular, continental pattern, 6in. diam., divided to 1/2°, horn centre. Arm extending 6in. over outer edge of circle	—			1 10 0
No. 891—	Ditto Plain circular, 6in. 30', engine divided ..	1	0	0	1 10 0
No. 892—	Ditto do. 9in. 30'	1	10	6	2 0 0
No. 893—	Ditto do. 10in. 15'	2	7	6	3 0 0
No. 894—	Ditto do. 12in. 10'	2	12	6	3 7 6
No. 895—	Ditto Semi-circular, 6in., reading to 30', bevelled edge	—			0 16 0
No. 896—	Ditto do. 8in... .. .	—			1 5 0

Celluloid Protractors



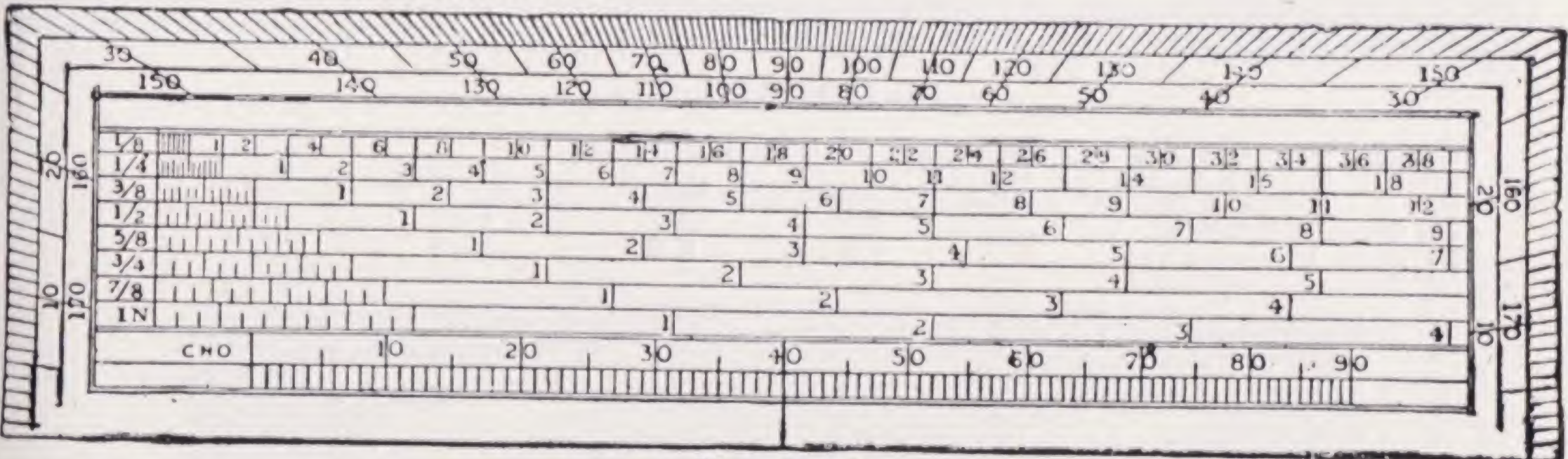
No. 900

No. 900—	Semi-circular, transparent celluloid, divided to 1/2°	4in. diameter	1/6
No. 901—	Ditto do. do. do.	6in. do.	1/9
No. 902—	Ditto do. do. do.	9in. do.	2/6
No. 903—	Ditto do. do. do.	12in. do.	6/6
No. 904—	Full circle, do. do. do.	6in. do.	4/-
No. 905—	Ditto do. do. do.	9in. do.	7/-
No. 906—	Ditto do. do. do.	12in. do.	10/6

Paper Protractors

No. 908—	Circular Protractor, divided 1/4°, printed on drawing paper, with numbers reading both ways... .. .	8in. diameter	1/-
No. 909—	Ditto do. printed on Bristol board	14in. do.	2/-
No. 910—	Ditto do. tracing paper	8in. do.	1/-
No. 911—	Ditto do. do. do.	14in. do.	1/6

Boxwood and Ivory Protractors

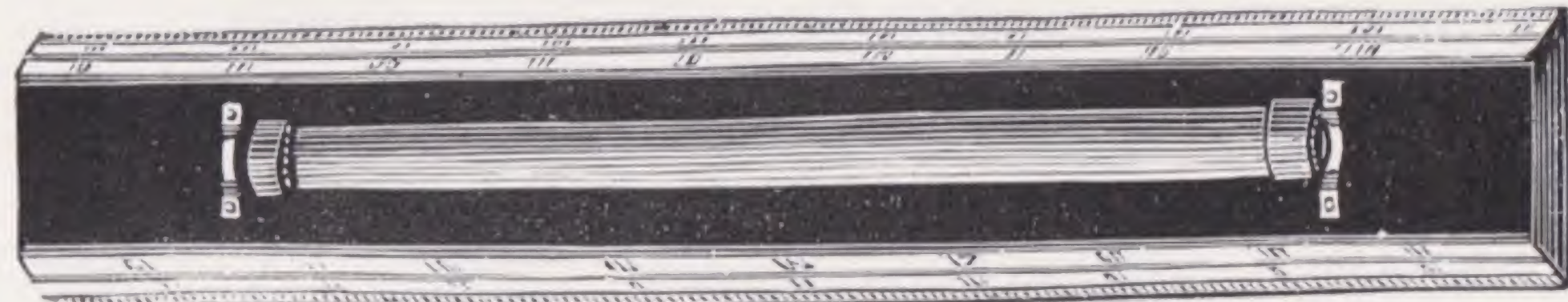


No. 914

Price

No. 914—	Square Boxwood Protractor, 6in. x 13 1/4in., divided whole degrees, 4 scales, diagonal scale, scale of chords	9d.
No. 915—	Ditto do. 8 scale	1/-
No. 916—	Square Ivory Protractor, 6in. x 13 1/4in., divided whole degrees, 1/4in., 1/2in., 3/4in., 1in. scales, scale of chords, diagonal scale, scale of 25, 30, 35, 40, 45 parts to the inch	4/-
No. 917—	Square Ivory Protractor, 6in. x 13 1/4in., divided whole degrees, 1/4in., 1/2in., 3/4in., 1in., 1 1/4in., 1 1/2in., 1 3/4in., 2in. scales, scale of chords, diagonal scale, scale of 30, 35, 40, 45, 50, 60 parts to the inch, scale of 40 on the lower edge..	7/-

Rolling Parallel Rulers



No. 920

No. 920—Ebony Rolling Parallel Rulers, brass mounted, white edges, divided $\frac{1}{2}$ in., $\frac{1}{4}$ in., $\frac{1}{8}$ in., in. to foot—

Length	12 in.	15 in.	18 in.
Price	12/6	15/-	20/-

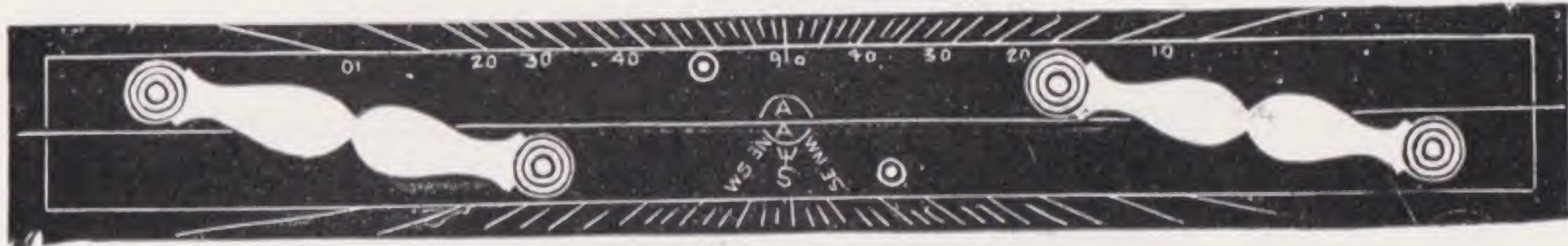
No. 921—Ebony Rolling Parallel Rulers, brass mounted—

Length	9 in.	12 in.	15 in.	18 in.
Price	8/-	9/6	11/3	13/9

No. 922—Gun-metal Rolling Parallel Rulers—

Length	9 in.	12 in.	15 in.	18 in.	24 in.
Price	20/-	27/6	32/6	43/-	55/-

Parallel Rules



No. 925

Captain Field's Improved Protracted Parallel Rules—

Length	12 in.	18 in.	21 in.	24 in.
No. 924—Boxwood	5/-	8/-	10/-	12/-
No. 925—Ebony	5/6	8/6	10/6	12/6

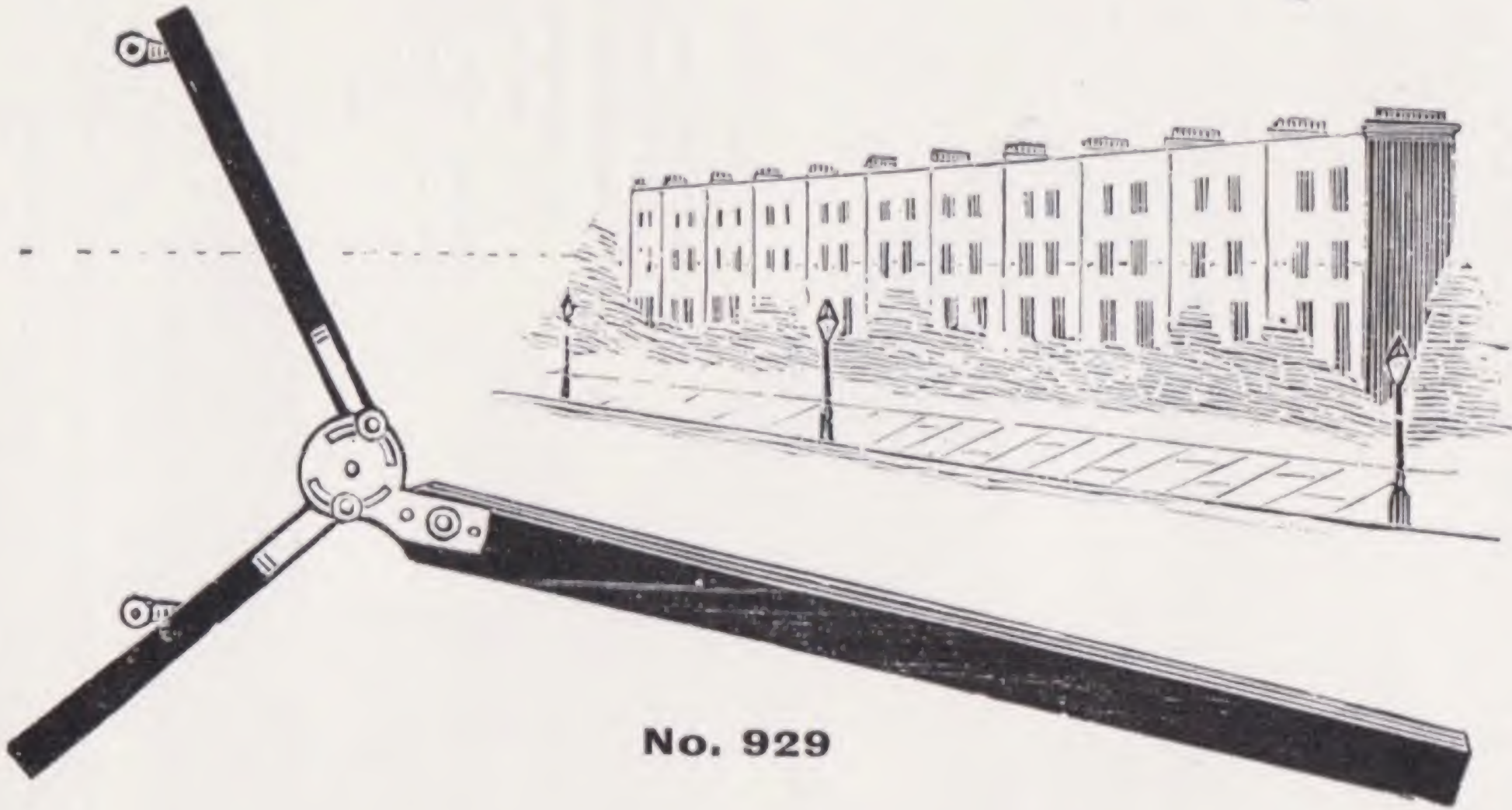


No. 927

No. 927—Ebony Parallel Rules, with brass bars—

Length	6 in.	9 in.	12 in.	15 in.	18 in.	24 in.
Price	1/2	2/3	2/9	3/6	4/6	7/-

Centrolineads for Perspective Drawing



No. 929

No. 929—Nicholson's Centrolinead, 30 in. x 42 in., ebony, with brass mounts and studs

£	s.	d.
1	0	0

No. 930—Ditto do. electrum mounts

£	s.	d.
1	5	0

No. 931—Eccentrolinead for eccentric lines, arms of wheels, &c.

£	s.	d.
0	9	0

Ellipses, Parabolas, Hyperbolas

No. 933—Ellipses, 2 in. to $4\frac{1}{2}$ in., vulcanite 6 in set

£	s.	d.
0	7	6

No. 934—,, $1\frac{1}{2}$ in. to 6 in. ,, 10 ,,

£	s.	d.
0	8	6

No. 935—Parabolas, $1\frac{1}{4}$ in. to $5\frac{1}{2}$ in. ,, 8 ,,

£	s.	d.
0	10	0

No. 936—,, $3\frac{1}{4}$ in. to $14\frac{1}{4}$ in. ,, 8 ,,

£	s.	d.
1	0	0

No. 937—Hyperbolas, 2 in. to $5\frac{1}{2}$ in. ,, 8 ,,

£	s.	d.
0	9	0

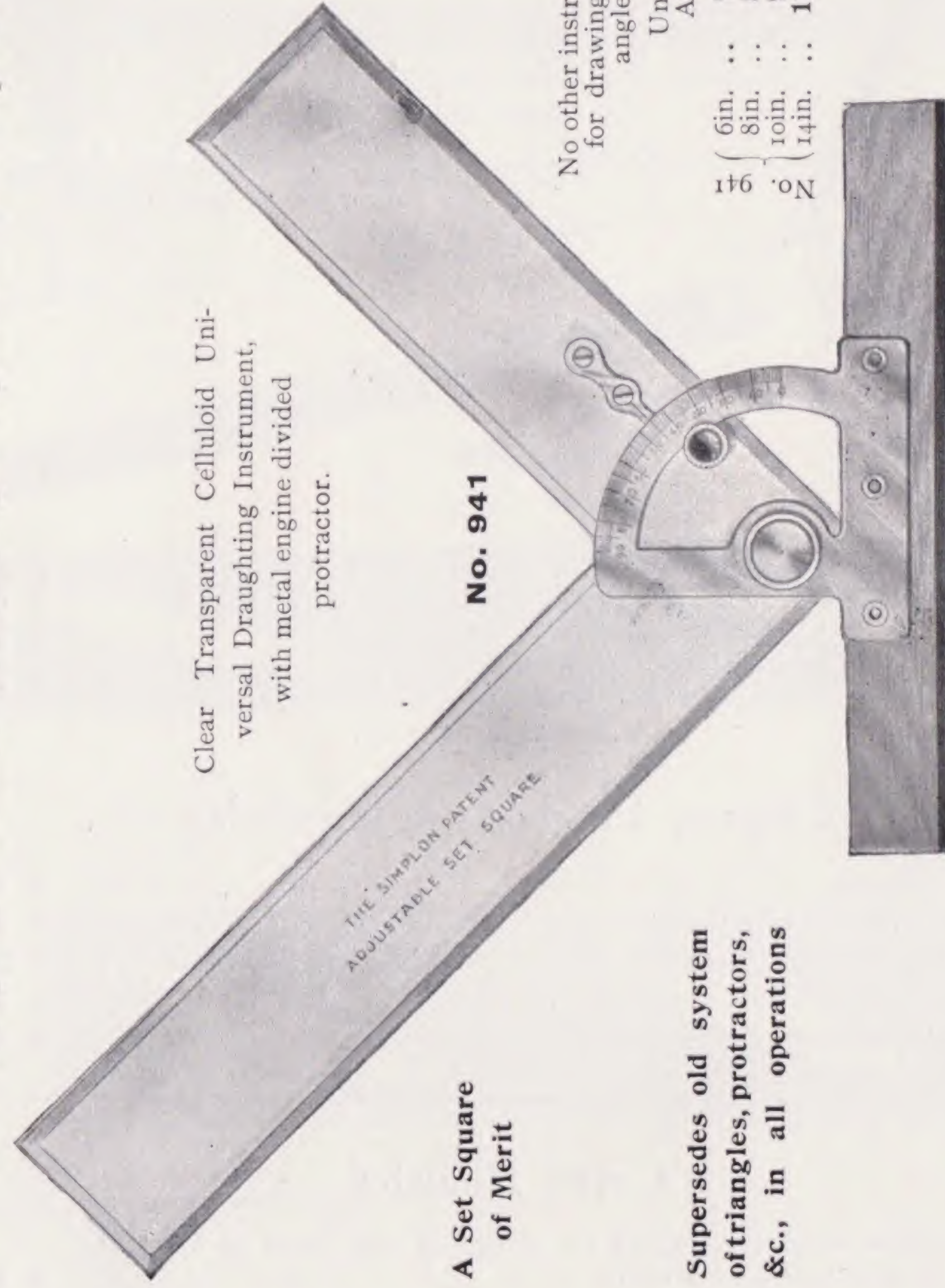
Curve Radiator

No. 939—Curve Radiator, to find the centre of any curve or to erect perpendiculars on a curve

£	s.	d.
0	2	3

“Simplon” Patent Protracting Adjustable Set Square

E. R. WATTS & SON



A Set Square of Merit

No. 941

Clear Transparent Celluloid Universal Draughting Instrument, with metal engine divided protractor.

No other instrument required for drawing vertical or angle lines			
	Unequal Arms	Equal Arms	
No. 941	6in. ..	7/-	7/9
	8in. ..	8/-	9/-
	10in. ..	9/-	10/-
No. 942	14in. ..	11/-	12/6

Supersedes old system of triangles, protractors, &c., in all operations

No. 942—The “Simplon” Patent Reversible Adjusting Set Square, similar to above, but without protractor.

Prices—Unequal arms ..	6in., 3/-	8in., 5/-	10in., 6/6
With equal arms ..	6in., 3/6	8in., 6/-	10in., 7/6

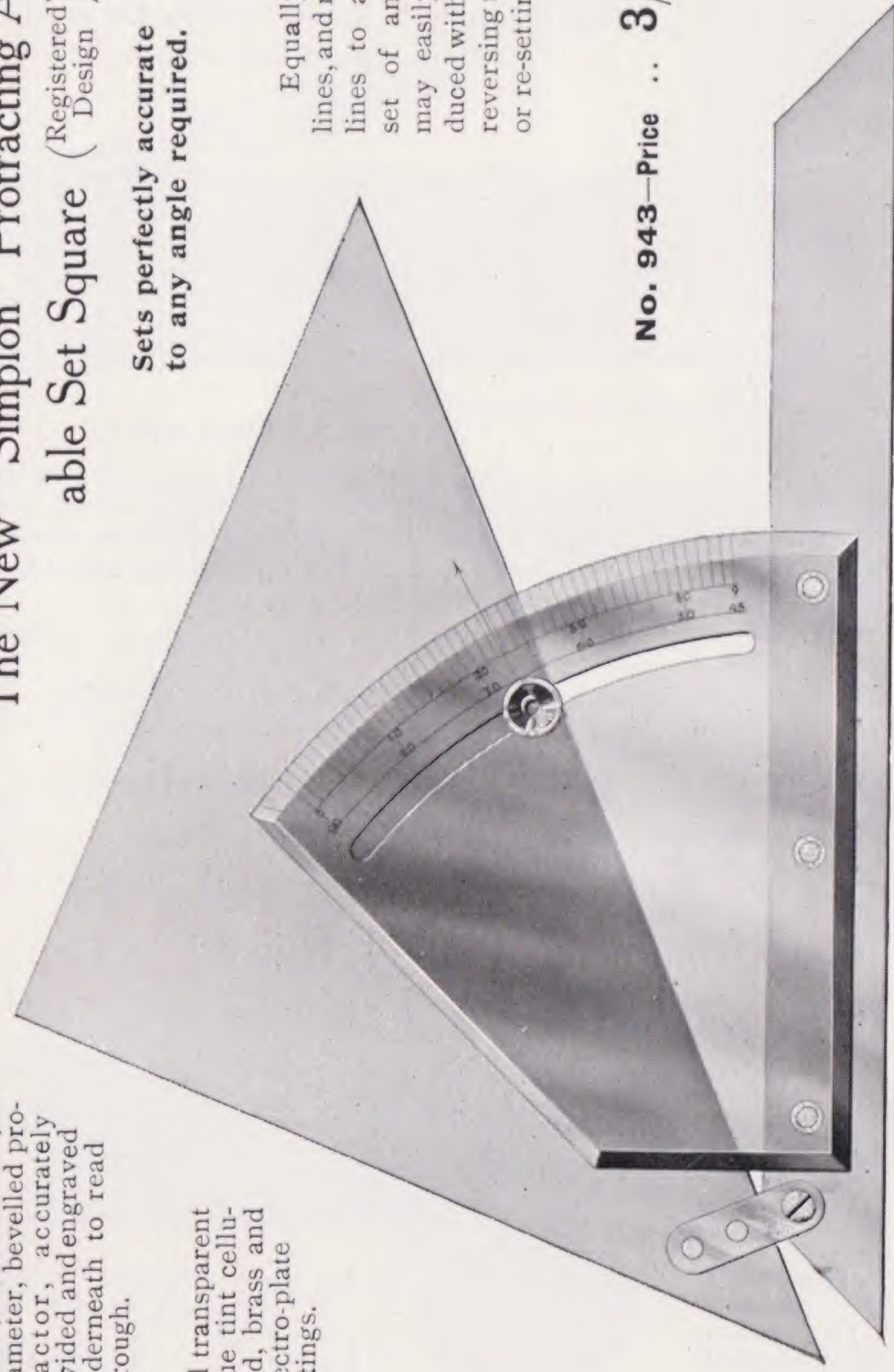
With 7in. arm, and 7in. diameter, bevelled protractor, accurately divided and engraved underneath to read through.

All transparent blue tint celluloid, brass and electro-plate fittings.

The New “Simplon” Protracting Adjustable Set Square (Registered Design)

Sets perfectly accurate to any angle required.

Equally inclined lines, and right angle lines to any other set of angle lines, may easily be produced without either reversing the square or re-setting.



No. 943—Price .. 3/-

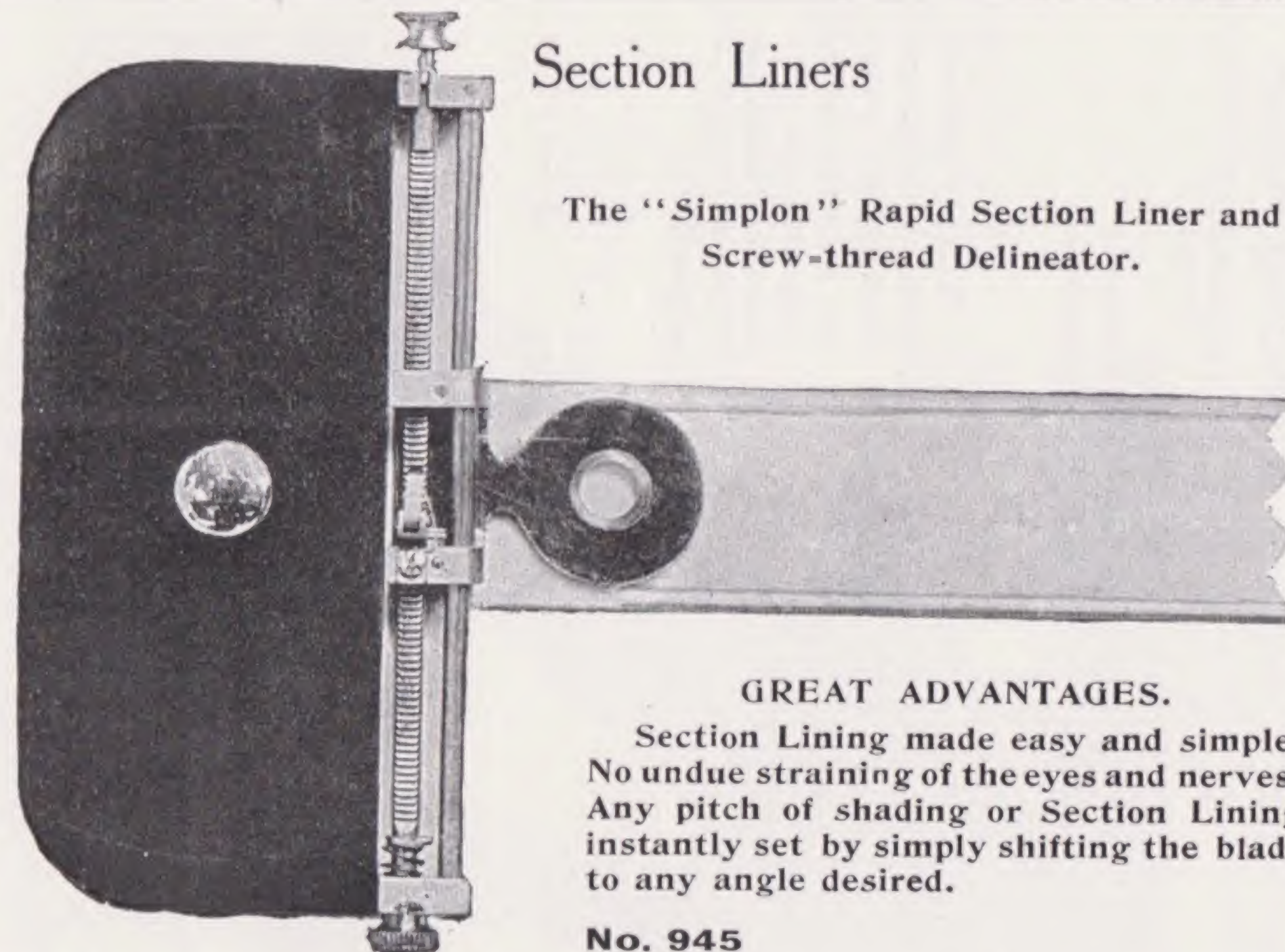
Adjustable Curve Ruler

No. 944—This rule can be bent as desired, and retains its shape. It can be formed for drawing all curves, and has two ruling edges, one round and the other square.

15in. long ..	3/6	3in. long ..	7/6
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Section Liners

The "Simplon" Rapid Section Liner and
Screw-thread Delineator.



GREAT ADVANTAGES.

Section Lining made easy and simple.
No undue straining of the eyes and nerves.
Any pitch of shading or Section Lining
instantly set by simply shifting the blade
to any angle desired.

No. 945

- No. 945—Polished mahogany stock, with handle covered on the underside with green baize to prevent slipping; thick celluloid blade, 12in. long, with bevelled edges, adjustable to any angle desired; a horizontal reciprocating machine-cut rack actuates the blade along a fixed steel spindle, which is supported on two adjustable bearings 12/6
- No. 946—Standard Section Liner, Hardwood, N. P. mountings, blade 9in. long, spacing from $\frac{1}{1000}$ in. to $\frac{1}{2}$ in. at any angle 9/-

The "Simplon" Handy Ruler



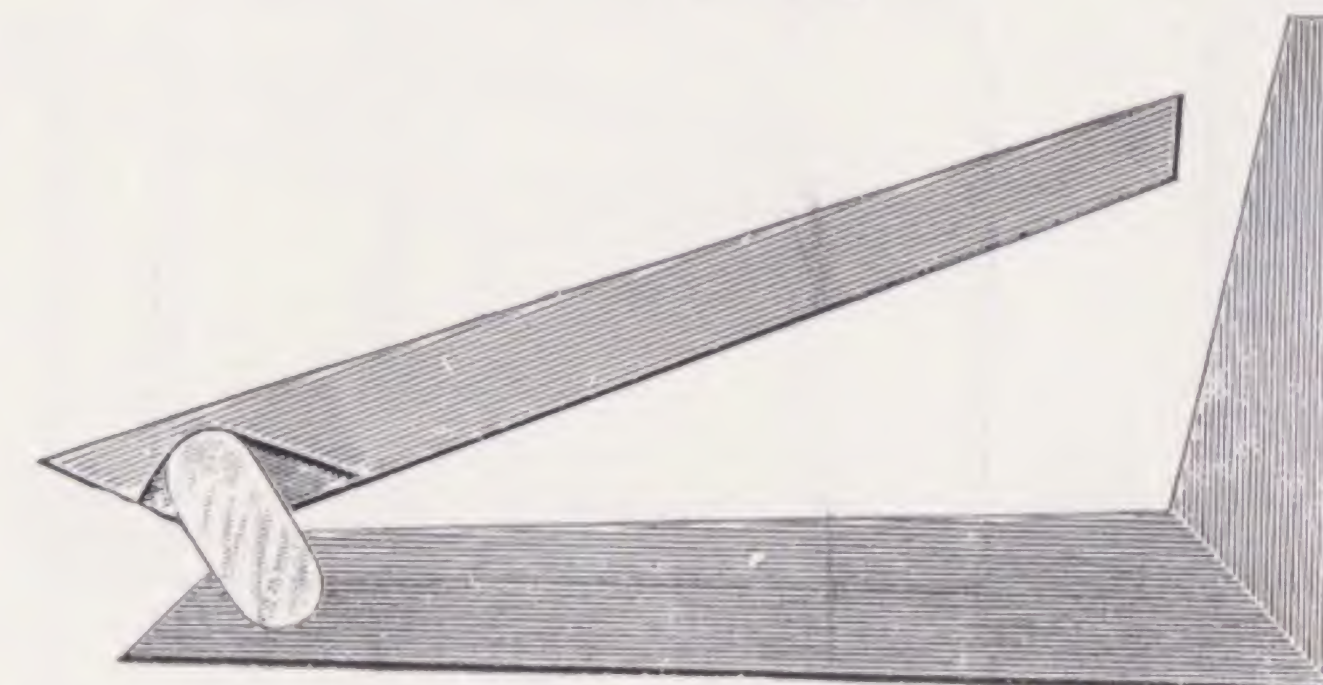
No. 947

- No. 947—Thick transparent celluloid, electro-plated curved metal handle.

An ideal straight edge for draughtsmen, tracers, and others.

Length ..	9in.	12in.
Price ..	1/9	2/6

Clinograph or Duplex Angle



No. 950

Straight Edges



No. 951

- No. 951—Mahogany, ebony edge, polished, best quality.
- | | | | | | | | | |
|-----------|-------|-------|-------|-------|-------|-------|-------|----------|
| Length .. | 18in. | 24in. | 30in. | 36in. | 42in. | 48in. | 54in. | 60in. |
| Price .. | 1/3 | 1/6 | 1/10 | 2/3 | 2/9 | 3/6 | 4/6 | 5/6 each |
- No. 952—Steel, nickel-plated, one edge bevelled.
- | | | | | | | | | | | |
|-----------|----------|----------|----------|----------|----------|-------|-------|----------|----------|-----------|
| Length .. | 12in. | 18in. | 24in. | 30in. | 36in. | 42in. | 48in. | 54in. | 60in. | 72in. |
| Width .. | 1 3/8in. | 1 3/8in. | 1 3/8in. | 1 3/8in. | 1 3/8in. | 2in. | 2in. | 2 1/4in. | 2 1/4in. | 2 1/2in. |
| Price .. | 2/8 | 4/- | 5/6 | 7/3 | 9/- | 10/9 | 13/- | 14/9 | 16/3 | 22/6 each |
- No. 953—Electrum, specially suitable for tropical climates, as they are impervious to rust.
- | | | | | | | | | | | |
|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------|
| Length .. | 12in. | 18in. | 24in. | 30in. | 36in. | 42in. | 48in. | 54in. | 60in. | 72in. |
| Price .. | 4/- | 6/- | 8/- | 11/- | 13/6 | 16/- | 20/- | 22/6 | 25/- | 36/- each |

Splines

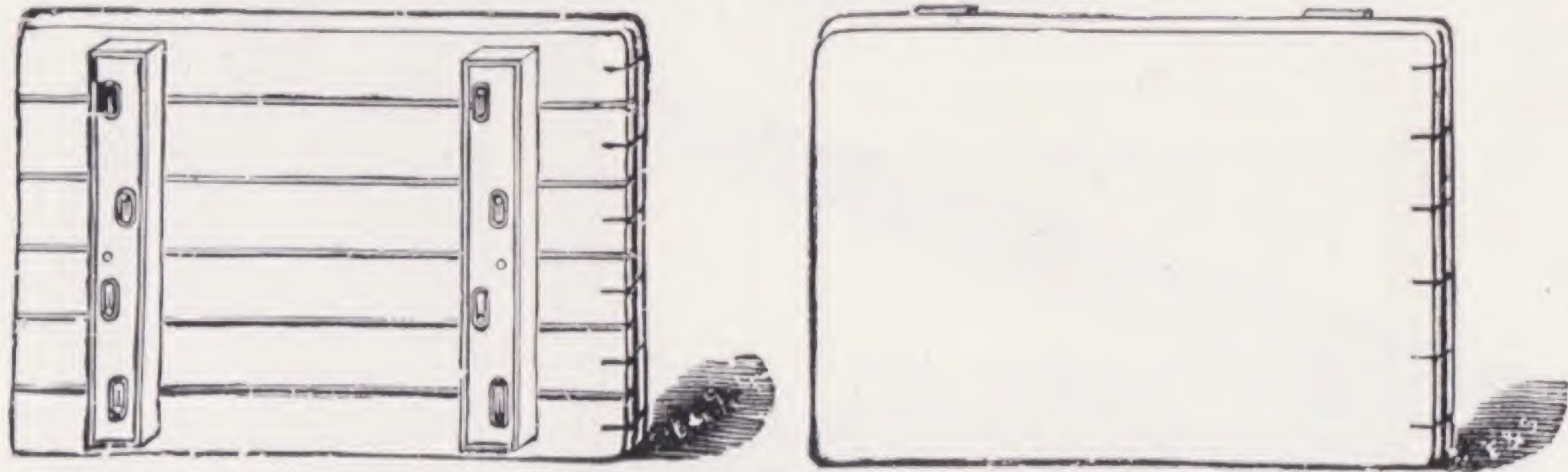
These Splines are grooved to admit the finger of the weight, for the purpose of holding the Spline in position.

Length ..	18in.	24in.	30in.	36in.	42in.
No. 955—Vulcanite..	1/3	1/6	2/-	2/3	2/6 each
No. 956—Xylonite ..	1/6	1/9	2/6	2/9	3/- ..
No. 957—Wood..	9d.	1/-	1/3	1/6	2/- ..

Spline Weights

- No. 959—Lead Weights for Splines, covered imitation leather, with finger, about 8 lbs. 6/- each
- No. 960—Do. do. about 3 lbs. 4/6 ..
- No. 961—Do. do. about 1 1/2 lbs. 2/9 ..

Drawing Boards



Nos. 964-969

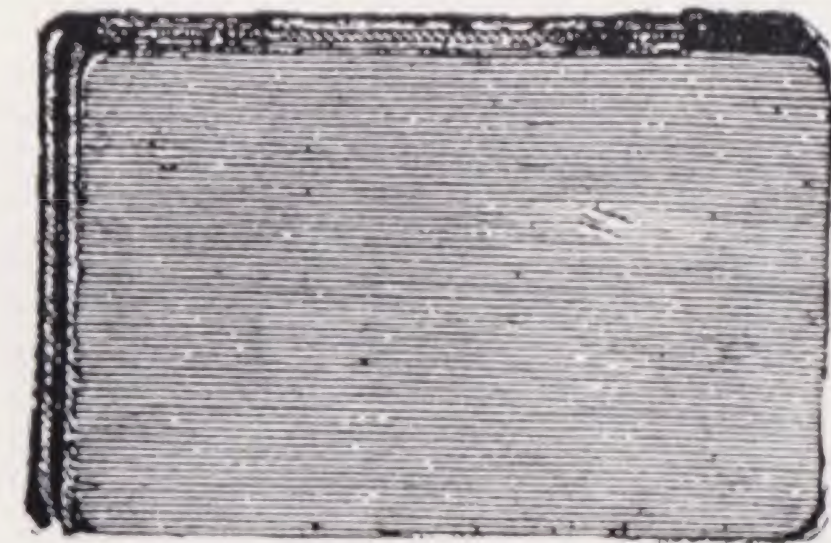
Engineers' or Architects' Drawing Boards, made from extra thick best seasoned pine, grooved mahogany battens, brass slots and screws, to allow for contraction, one edge inlaid with ebony.

		Best Quality			Second Quality		
		£	s.	d.	£	s.	d.
No. 964	23in. × 16in.	0	10	0	0	8	6
No. 965	28in. × 21in.	0	11	4	0	10	6
No. 966	32in. × 23in.	0	14	8	0	13	0
No. 967	41in. × 28in.	1	2	0	0	19	0
No. 968	42in. × 29in.	1	3	0	1	0	0
No. 969	54in. × 32in.	1	12	0	1	7	6

Drawing Boards (Pine)

With steel U-shaped stiffeners (coppered) fitted to both ends of board. Specially adapted for tropical use.

No. 972	18in. × 13½in.	2/9
No. 973	20in. × 15½in.	3/4
No. 974	23in. × 17in.	4/-
No. 975	28in. × 21in.	5/-
No. 976	32in. × 23in.	6/3

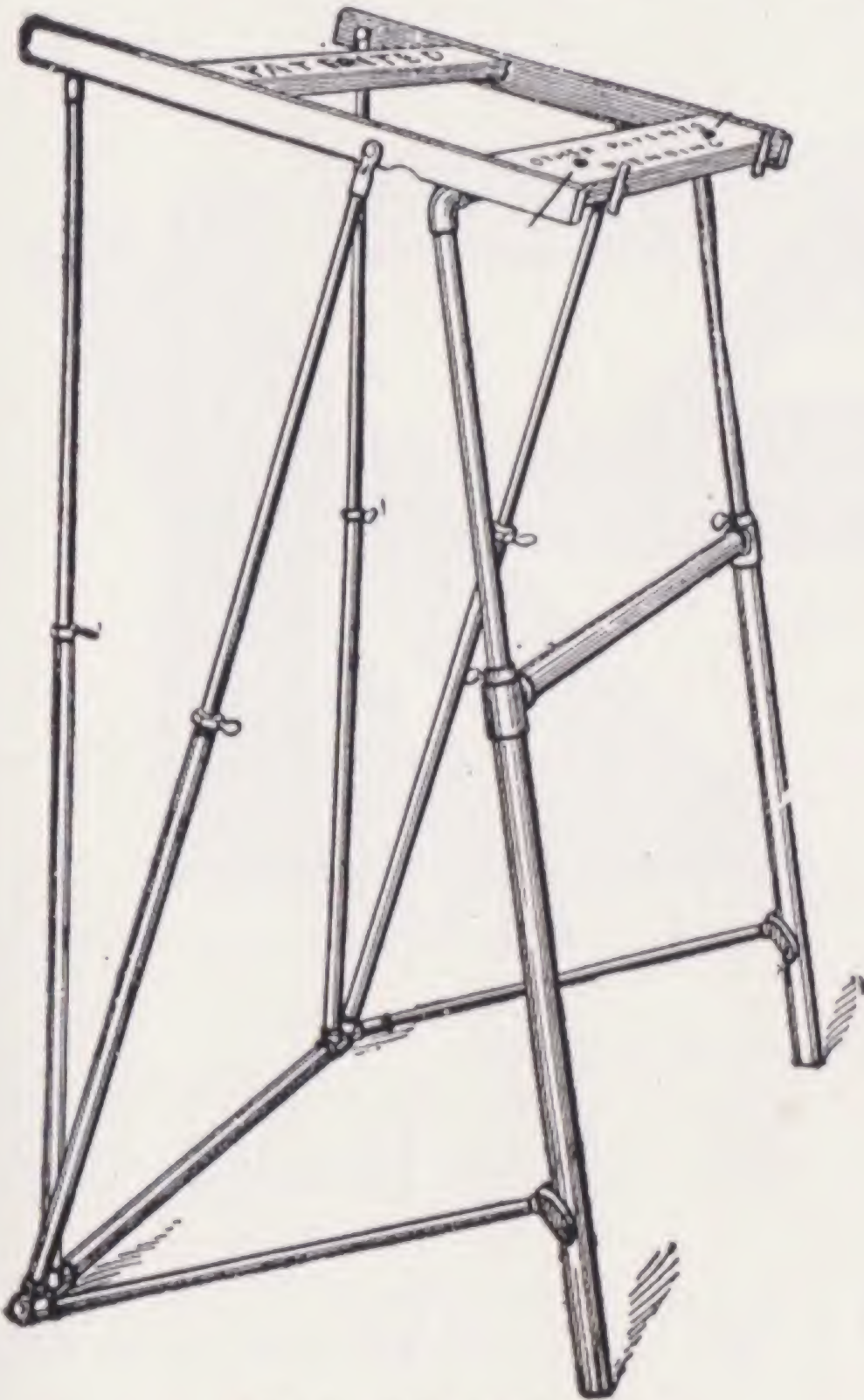


Nos. 979-981

Triplex Drawing Boards of three layers of well-seasoned wood, centre layer placed transversely to outer boards, and glued together under high pressure, preventing warping or twisting.

No. 979	23in. × 16in.	3/-
No. 980	24in. × 19in.	3/6
No. 981	31in. × 23in.	5/-

Tubular Folding Drawing Stand



Nos. 983-984

Portable. Compact. Rigid.

Adjustable for any height or slope. Can be instantly levelled on any uneven floor. No warping or binding of adjustments. Nothing to break or get out of order. Suitable for drawing office, studio, school, or college.

	£	s.	d.
No. 983—Trestle top, 20½in. × 19½in., to hold Imperial drawing boards	2	10	0
No. 984—Do. 26½in. × 20½in. to hold Double Elephant drawing boards	2	17	6

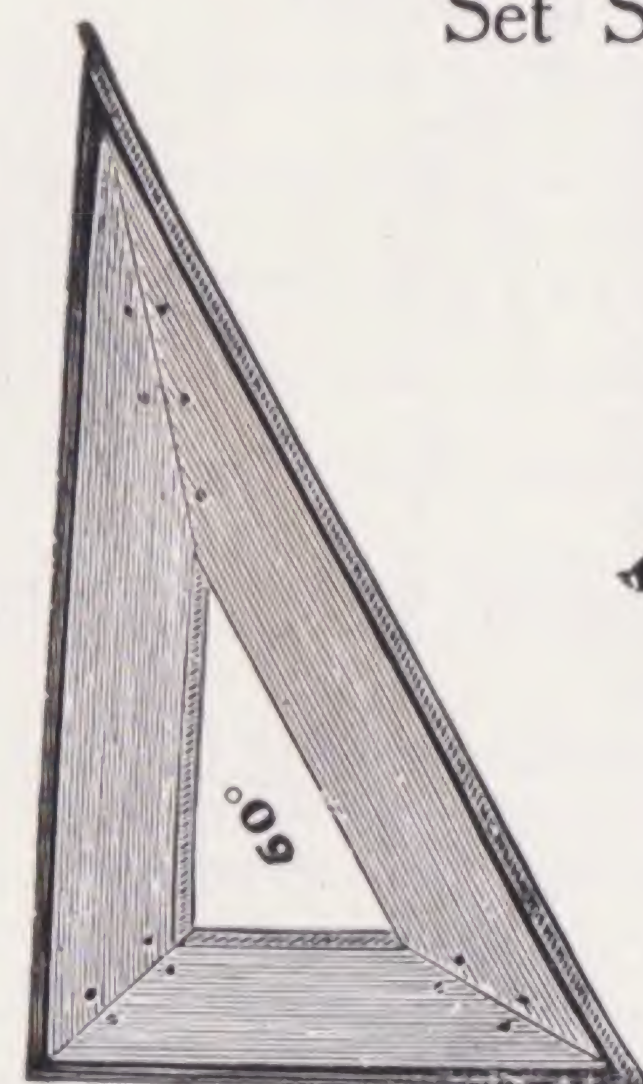
Slopes and Batters

	Vulcanite	Pearwood	Celluloid
No. 985—Set of six 4in.	3/6	2/3	4/3
No. 986—Set of eight 6in.	6/-	3/6	7/6

Pitches for Roofs

	Vulcanite	Pearwood	Celluloid
No. 987—Set of six 6in.	4/3	2/6	5/6

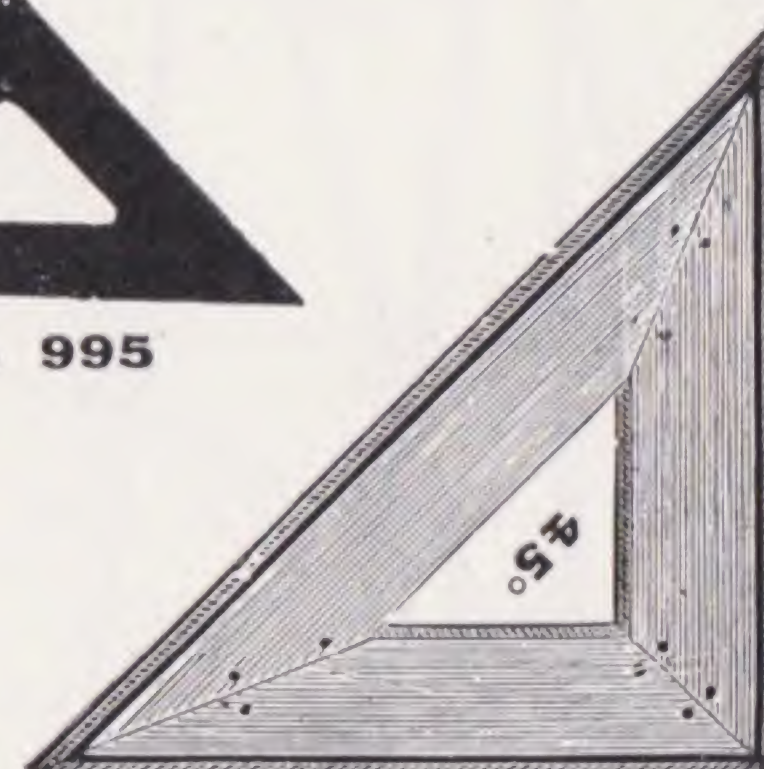
Set Squares or Triangles



No. 991



No. 995



No. 992

Polished mahogany, with bevelled ebony edges, superior quality.

	4in.	6in.	8in.	10in.	12in.	15in.	18in.
No. 991—60° and 67½°	1/6	2/-	2/6	3/-	3/9	4/6	6/-
No. 992—45°	2/-	2/6	3/-	3/6	4/6	5/6	7/-

Pearwood Set Squares.

	4in.	6in.	8in.	10in.
No. 993—45° or 60°	3d.	4d.	6d.	8d.

Vulcanite, open centres.

	4in.	5in.	6in.	7in.	8in.	9in.	10in.	12in.	14in.	16in.
No. 994—60° and 67½°	6d.	7d.	8d.	10d.	1/-	1/2	1/4	1/10	2/3	3/3
No. 995—45°	7d.	9d.	1/-	1/3	1/6	1/9	2/-	3/-	3/9	5/3

Transparent Xylonite or Celluloid, open centres.

	4in.	5in.	6in.	7in.	8in.	9in.	10in.	12in.	14in.	16in.
No. 996—60° and 67½°	6d.	8d.	9d.	1/-	1/2	1/5	1/8	2/3	3/-	4/3
No. 997—45°	8d.	10d.	1/-	1/5	1/10	2/-	2/6	3/6	4/6	6/-

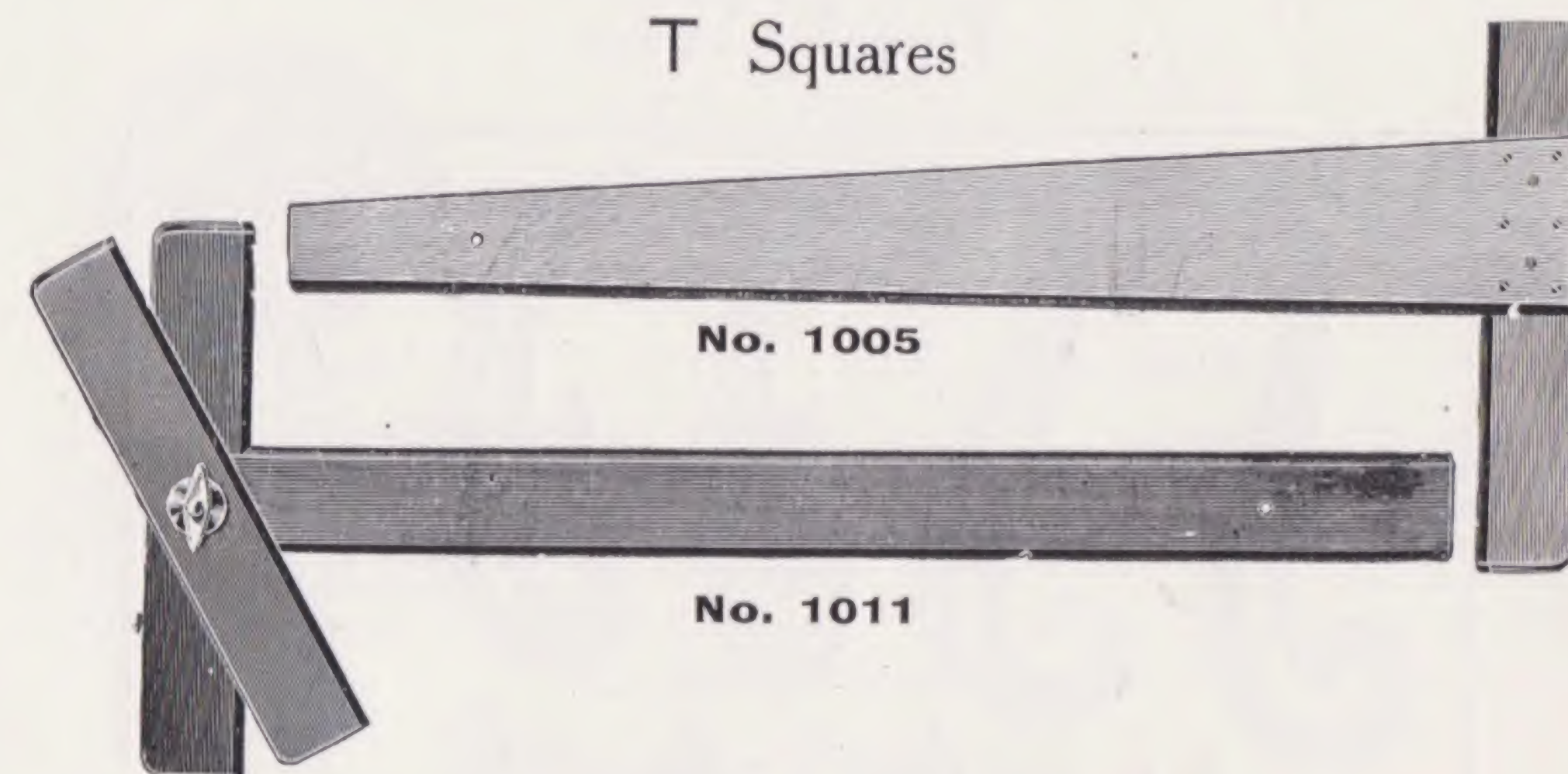
Protracted Set Squares, transparent celluloid.

	6in.	8in.	10in.
No. 998—60° and 67½°	—	2/-	3/-
No. 999—45°	1/8	2/6	—

German-silver Triangles, with button handles.

	4in.	5in.	6in.
No. 1000—60° and 67½°	1/9	2/3	3/6
No. 1001—45°	2/3	3/6	—

T Squares



Polished mahogany, extra finish, pegged and keyed, taper blade, transparent celluloid edge (brass edge at same prices).

Length	24in.	30in.	36in.	42in.	48in.	54in.
No. 1004—Each	5/-	6/6	7/9	9/-	10/3	12/-

Polished mahogany, ebony edge, taper blade, pegged and keyed.

Length	18in.	24in.	30in.	36in.	42in.	48in.	54in.
No. 1005—Best quality, each	3/-	4/-	5/-	6/-	7/-	8/3	9/6
No. 1006—Second quality, each	2/6	3/3	4/3	5/-	5/9	6/6	7/6

Polished mahogany, parallel blade, two ebony edges.

Length	18in.	24in.	30in.	36in.	42in.	48in.	54in.
No. 1007—Each	3/3	4/6	6/-	7/3	8/6	9/3	10/9

Pearwood, taper blade, one bevelled edge.

Length	18in.	24in.	30in.	36in.	42in.	48in.	54in.
No. 1008—Best quality, each	1/6	2/6	2/9	3/3	3/9	4/6	5/-
No. 1009—Second quality, each	1/3	1/6	1/9	2/3	2/9	3/6	4/-

Shifting Head T Squares, two edges, with double shifting head, one side movable, or single shifting head, with blade centred in the thickness.

Length	24in.	30in.	36in.	42in.	48in.	54in.
No. 1010—Polished mahogany, cell. edge, each	10/6	11/9	13/6	16/3	19/-	22/6
No. 1011— „ „ ebony edge, each	7/6	8/6	10/-	11/6	13/3	15/-
No. 1012—Unpolished pearwood, each	5/-	6/-	6/9	7/9	9/-	10/3

French Curves

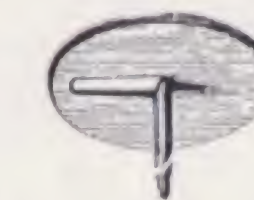


See opposite page.

Drawing Pins



No. 1015

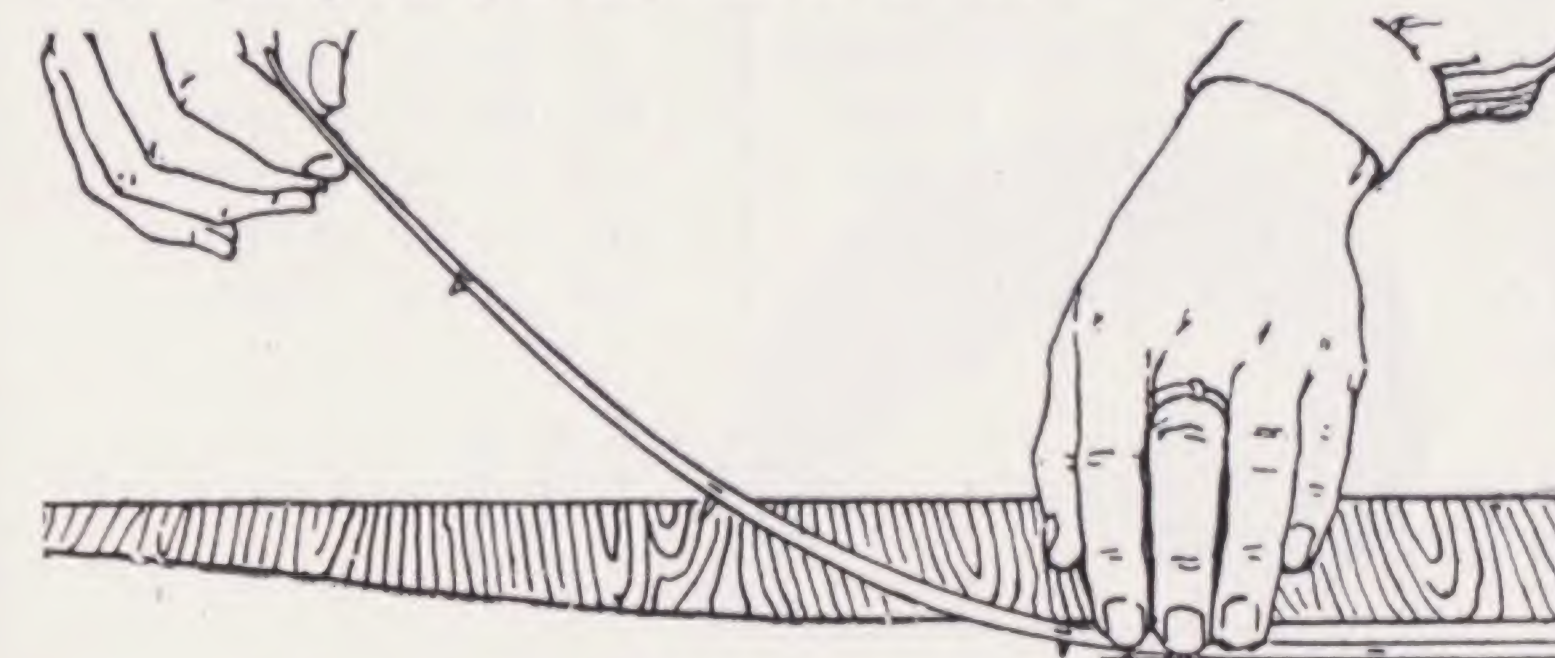


No. 1016

No. 1015—"Best of All"	per doz., 5d., 6d., and 7d.
No. 1016—Steel stamped from one piece	per 100, 1/-, 1/3, and 1/9
No. 1017—Bevelled edges, brass	per doz., 5d., 6d., and 7d.
No. 1018—" " German-silver	per doz., 9d., 10d., and 1/-
No. 1019—Horn Centres	per doz. 2/6
No. 1020—Pin Lifters	each 9d.

Drawing Pin Strips

These Strips keep the paper much flatter on the board, and will be found a great improvement on the ordinary drawing pin. They can be supplied in any length, or can be easily cut up at any time to suit requirements.



No. 1021—4oin. long,
plain steel.

1/- each; 10/- doz.

No. 1022—4oin. long,
nickel-plated.

1/6 each; 15/- doz.

French Curves

No. 1023—Made of well-seasoned Pearwood—

Nos. 6, 9, 14, 19, 21	each	4d.
Nos. 1, 2, 3, 4, 5, 7, 8, 10, 11, 12, 13, 15, 16, 17, 18, 20, 22, 23, 24	"	6d.

No. 1024—Transparent Celluloid—

Nos. 6, 9, 14, 19, 21	"	2/-
Nos. 1, 2, 3, 4, 5, 7, 8, 10, 11, 12, 13, 15, 16, 17, 18, 20, 22, 23, 24	"	3/-

For illustrations see page 124

Railway Curves



No. 1026

No. 1026—Vulcanite Railway Curves, with tangent, 41 in set, marked in degrees and inches to scale 100ft. = 1in.

0° 30' = 114.59in.	4° 15' = 13.48in.	7° 45' = 7.40in.
1° 00' = 57.30in.	4° 30' = 12.73in.	8° 00' = 7.17in.
1° 15' = 45.84in.	4° 45' = 12.07in.	8° 15' = 6.95in.
1° 30' = 38.20in.	5° 00' = 11.46in.	8° 30' = 6.75in.
1° 45' = 32.74in.	5° 15' = 10.92in.	8° 45' = 6.55in.
2° 00' = 28.65in.	5° 30' = 10.42in.	9° 00' = 6.37in.
2° 15' = 25.47in.	5° 45' = 9.97in.	9° 15' = 6.20in.
2° 30' = 22.92in.	6° 00' = 9.55in.	9° 30' = 6.04in.
2° 45' = 20.84in.	6° 15' = 9.17in.	9° 45' = 5.88in.
3° 00' = 19.10in.	6° 30' = 8.82in.	10° 00' = 5.74in.
3° 15' = 17.63in.	6° 45' = 8.49in.	10° 30' = 5.48in.
3° 30' = 16.37in.	7° 00' = 8.19in.	11° 00' = 5.22in.
3° 45' = 15.28in.	7° 15' = 7.91in.	11° 30' = 4.99in.
4° 00' = 14.33in.	7° 30' = 7.64in.	

	£	s.	d.
Set in wooden box, complete	4	17	6
Single Curves, each	0	3	6

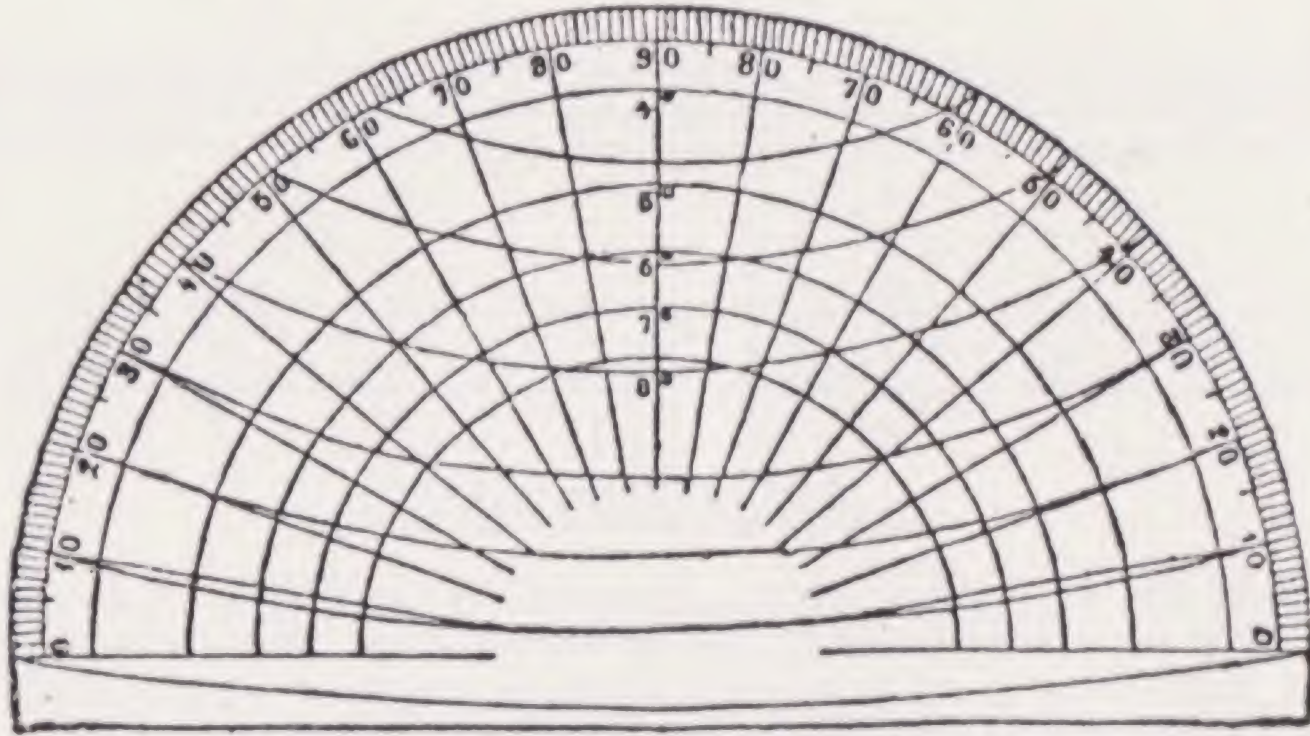
Copenhagen Ship Curves

	Price
No. 1027—Pearwood, set of 45, complete in case	£ 1 10 0
No. 1028—Vulcanite do. do.	3 3 0
No. 1029—Transparent celluloid do. do.	3 15 0

Lettering Set Squares or Angles

	4in.	6in.
No. 1030—Vulcanite Lettering Angles, three in set.. .. .	2/9	3/3
No. 1031—Transparent celluloid do. do. do.	3/-	3/9

Railway Curve Protractor



No. 1033

No. 1033—Xylonite Railway Curve Protractor, 8ins. divided to 1/2 degrees with circular curves 1/2, 1, 1 1/2, 2, 2 1/2, 3, 3 1/2, 4, 5, 6, 7, 8 degrees, scale 400ft. to 1in.
No. 1034—Ditto do. 10ins. divided to 1/2 degrees, with circular curves 1, 1 1/2, 2, 2 1/2, 3, 3 1/2, 4, 5, 6, 7, 8, 10, 12, 14, 16, 18, 20 degrees, scale 100ft. to 1in.

Price
9/-
12/-

Logarithmic Curve



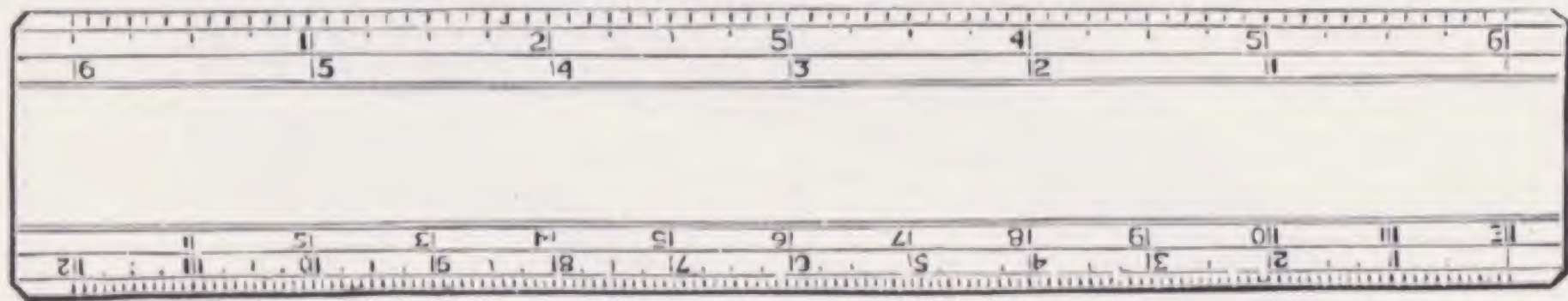
No. 1035

This Curve contains every curve up to the limit of its size, and is constructed mathematically. Various calculations can be made, and its scope is practically unlimited.
No. 1035—Vulcanite each 5/-
No. 1036—Transparent celluloid ,, 6/-

Curves for Mechanical Engineers

No. 1037—Vulcanite set of 10	12/-
No. 1038—Transparent celluloid set of 10	17/6

Engine Divided Scales



It is impossible to catalogue every description of Scale that we supply. The following are fairly representative of those scales more generally in use. Every description of scale, including metric, can be made to order at corresponding prices. Ivory Scales can be re-divided when the edges are worn.

Architects' and Engineers' Scales

	Plain Edge	White Edge
No. 1040—6in. Flat Boxwood Scale, both edges bevelled, divided $\frac{1}{8}$ in., $\frac{1}{4}$ in., $\frac{1}{2}$ in., 1 in. to foot	1/-	1/6
No. 1041—12in. Flat Boxwood Scale, both edges bevelled, divided $\frac{1}{8}$ in., $\frac{1}{4}$ in., $\frac{1}{2}$ in., 1 in. to foot	1/6	2/6
No. 1042—12in. Flat Boxwood Scale, both edges bevelled, divided $\frac{3}{8}$ in., $\frac{3}{4}$ in., 1 $\frac{1}{2}$ in., 3 in. to foot	1/6	2/6
No. 1043—12in. Flat Boxwood Scale, both sides bevelled and divided $\frac{1}{8}$ in., $\frac{1}{4}$ in., $\frac{1}{2}$ in., 1 in. \times $\frac{3}{8}$ in., $\frac{3}{4}$ in., 1 $\frac{1}{2}$ in., 3 in. to foot	1/9	3/-

Sets of Scales

Each Scale has same division on both edges, one edge reading from left to right, and the other right to left.

	Plain Edge	White Edge
No. 1044—Set of four 12in. Boxwood Scales, divided $\frac{1}{8}$ in., $\frac{1}{4}$ in., $\frac{1}{2}$ in., 1 in. to foot, in case	9/-	13/-
No. 1045—Set of eight 12in. Boxwood Scales, divided $\frac{1}{8}$ in., $\frac{1}{4}$ in., $\frac{3}{8}$ in., $\frac{1}{2}$ in., $\frac{3}{4}$ in., 1 in., 1 $\frac{1}{2}$ in., 3 in. to foot, in case	16/-	25/-
No. 1046—Set of twelve 12in. Boxwood Scales, divided $\frac{1}{8}$ in., $\frac{1}{4}$ in., $\frac{3}{8}$ in., $\frac{1}{2}$ in., $\frac{3}{4}$ in., 1 in., 1 $\frac{1}{2}$ in., 2 in., 3 in., 4 in., 6 in. to foot and $\frac{1}{16}$ full size, in case	21/-	37/6

Any of the above scales can be supplied in Ivory to order.

Oval Scales

No. 1047—6in. Oval Boxwood Scale, engine divided, numbered to read both ways on edges $\frac{1}{8}$ in., $\frac{1}{4}$ in., $\frac{1}{2}$ in., 1 in.	1/6
No. 1048—12in. Oval Boxwood Scale, engine divided, numbered to read both ways on edges $\frac{1}{8}$ in., $\frac{1}{4}$ in., $\frac{1}{2}$ in., 1 in.	2/6

Chain Scales

		Plain Edge	White Edge
No. 1050—6in. Flat Boxwood Scales, divided 10 \times 20 parts to the inch		1/-	1/9
No. 1051—6in. " " 30 \times 40 " "		1/-	1/9
No. 1052—6in. " " 50 \times 60 " "		1/-	1/9
No. 1053—6in. " " 80 \times 100 " "		1/2	2/3
No. 1054—12in. " " 10 \times 20 " "		1/6	3/-
No. 1055—12in. " " 30 \times 40 " "		1/6	3/-
No. 1056—12in. " " 50 \times 60 " "		1/6	3/-
No. 1057—12in. " " 80 \times 100 " "		2/-	3/6

Chain Scales, in Sets

No. 1060—Set of four 12in. Boxwood Scales, divided 10 \times 20, 30 \times 40, 50 \times 60, 80 \times 100 parts to the inch, in case	9/-	22/6
No. 1061—Set of eight Boxwood Scales; four 12in. and four 2in. Offset Scales to match, divided 10 \times 20, 30 \times 40, 50 \times 60, 80 \times 100 parts to the inch, in case	12/-	37/6

Each scale has two different divisions, one on each edge, each of which is numbered to read both ways.

No. 1063—Set of six 12in. Boxwood Scales, divided 10, 20, 30, 40, 50, 60 parts to the inch, in case	12/6	25/-
No. 1064—Set of eight 12in. Boxwood Scales, divided 10, 20, 30, 40, 50, 60, 80, 100 parts to the inch, in case	15/-	30/-

Each scale has the same divisions on both edges, and is numbered to read both ways.

Offset Scales

No. 1066—2in. Flat Boxwood Offset Scale, divided 10 \times 20	6d.	1/-
No. 1067—2in. " " 30 \times 40	6d.	1/-
No. 1068—2in. " " 50 \times 60	6d.	1/-
No. 1069—2in. " " 80 \times 100	8d.	1/3

Any of the above scales can be supplied in ivory to order.

Card Scales

Printed on Bristol Board

No. 1070—Set of eight 12in. Card Scales, divided 12in. and 6in., 1 $\frac{1}{2}$ in. and 3in., 2in. and 4in., $\frac{1}{2}$ in. and 1in., $\frac{3}{4}$ in. and $\frac{1}{4}$ in., $\frac{1}{8}$ in. and $\frac{1}{16}$ in. to a foot per set	1/-
No. 1071—Card Chain Scales each	6d.

Improved Triangular Boxwood Scales

For Architects and Mechanical Engineers

	Plain Edge	White Edge
No. 1075—6in. Triangular Boxwood Scales, engine divided, $\frac{3}{32}$ in., $\frac{3}{16}$ in., $\frac{1}{4}$ in., $\frac{1}{2}$ in., $\frac{3}{4}$ in., 1in., $1\frac{1}{2}$ in., 3in. to the foot, $\frac{1}{16}$ in. ..	3/-	5/-
No. 1076—12in. Ditto .. do. .. do. ..	5/6	10/-
No. 1077—12in. Triangular Boxwood Scales, engine divided, $\frac{1}{8}$ in., $\frac{1}{4}$ in., $\frac{3}{8}$ in., $\frac{1}{2}$ in., $\frac{3}{4}$ in., 1in., $1\frac{1}{2}$ in., 2in., 3in., 4in. to the foot, $\frac{1}{16}$ in. ..	5/6	10/-

For Civil Engineers and Surveyors

No. 1078—6in. Triangular Boxwood Chain Scale, divided 10, 20, 30, 40, 50, 60 parts to the inch	3/-	5/-
No. 1079—12in. Ditto .. do.	5/6	10/-
No. 1080—12in. Triangular Boxwood Chain Scale, divided 20, 30, 40, 50, 60, 80 parts to the inch	6/-	10/6
No. 1081—2in. Triangular Offset Chain Scales	—	1/6

Metal Scales

The liability of wood scales to crack, warp, or twist, the chipping of their edges, and their variation from standard measurement, are well known to all who have used them. These **metal** scales are not liable to any of these defects, and are therefore specially recommended for tropical climates.



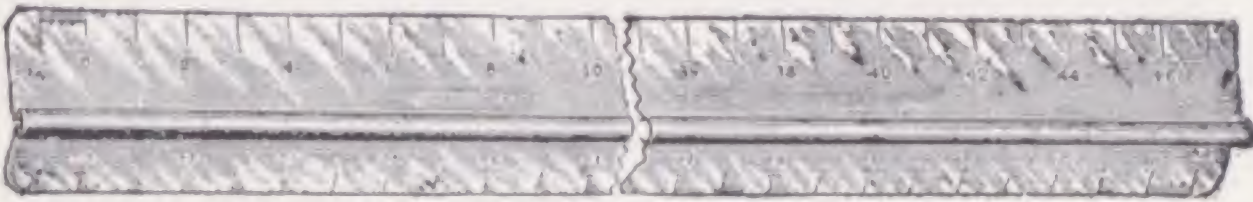
No. 1082

Made from brass tubing nickelled with a dull finish, and weighing $3\frac{1}{2}$ ozs. The ends are covered with hardened steel plates that slightly raise the scales from the paper, and prevent the graduations wearing.

No. 1082—12in. Triangular Metallic Scale (Architect's), divided $\frac{3}{32}$ in., $\frac{3}{16}$ in., $\frac{1}{8}$ in., $\frac{1}{4}$ in., $\frac{3}{8}$ in., $\frac{1}{2}$ in., $\frac{3}{4}$ in., 1in., $1\frac{1}{2}$ in., 3in. to the foot, $\frac{1}{16}$ in.	12/6
No. 1083—12in. Triangular Metallic Chain Scale (Engineer's), divided 10, 20, 30, 40, 50, 60 parts to the inch	12/6
No. 1084—12in. Triangular Metallic Chain Scale (Engineer's), divided 20, 30, 40, 50, 60, 80 parts to the inch	12/6

Metal Scales—(Continued)

Improved Metal Draughtsmen's Scales

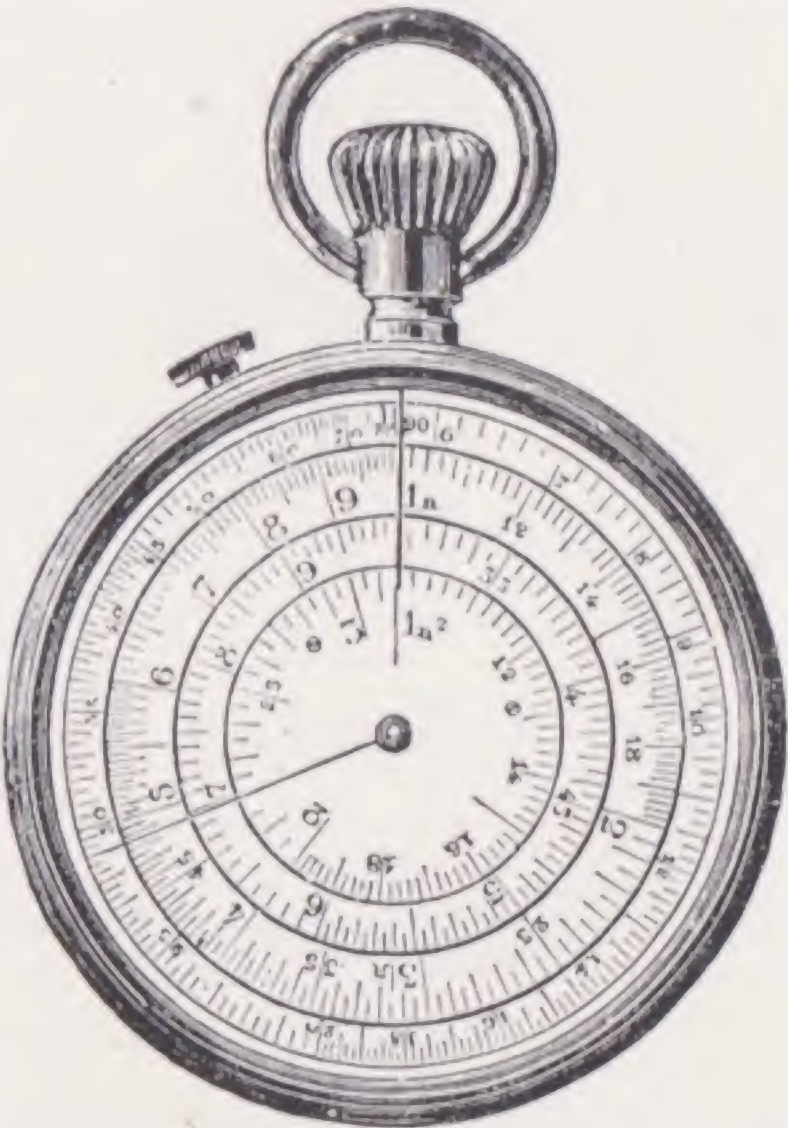


No. 1087

Made of steel, and nickelled with a dull finish. Each Scale has one kind of graduation, the same on both edges, or two kinds, one on each edge, and are supplied with any of the usual architects' or engineers' graduations.

No. 1087—6in.	5/- each.	No. 1088—12in.	6/6 each.
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Calculators and Slide Rules



No. 1090

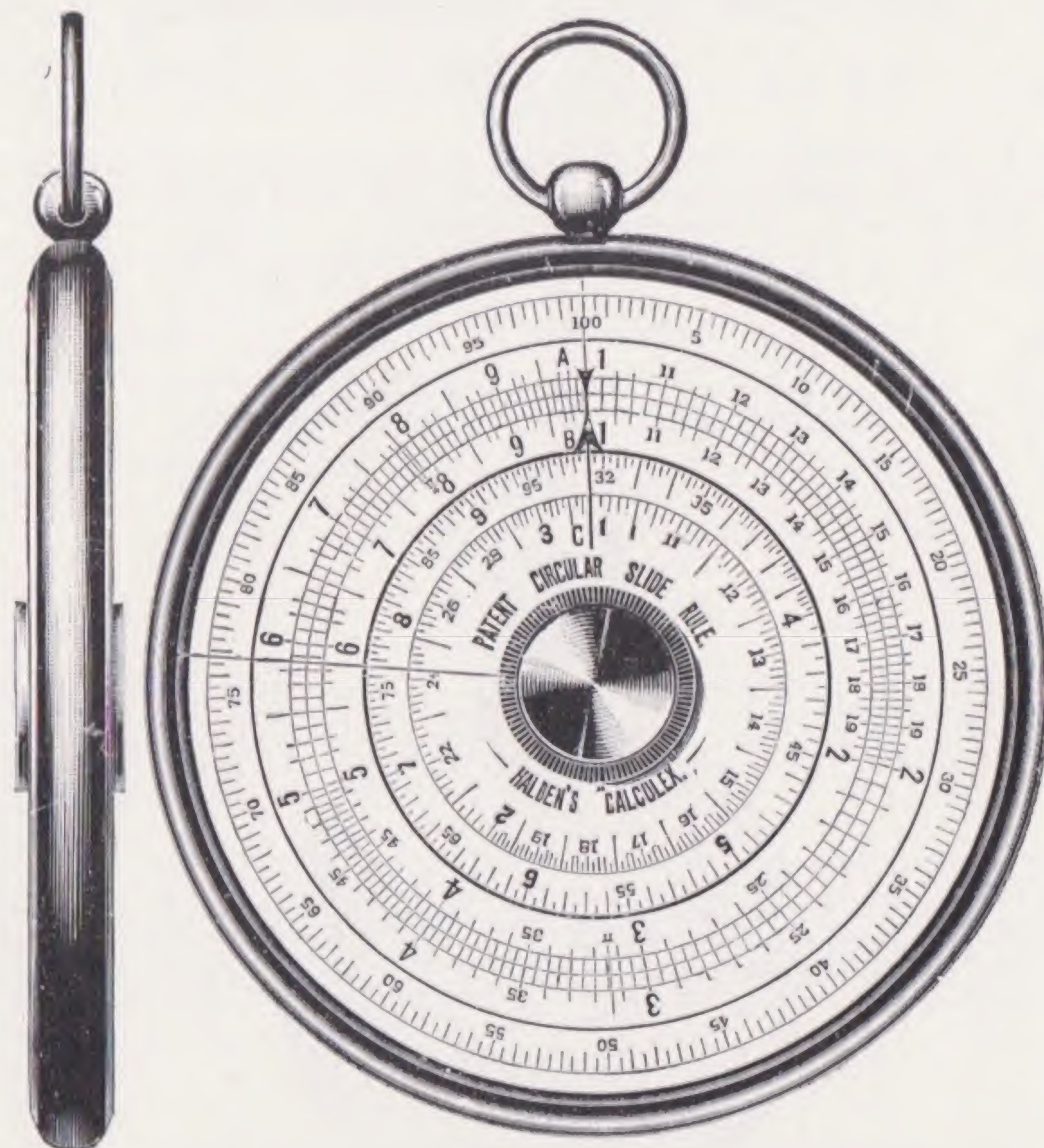
No. 1090—**Boucher's Calculator**, enamelled cardboard dials. In form and size resembling a keyless watch. For solving problems in multiplication, division, proportion, square and cube root, logarithms, and trigonometry

Price	Code Word
12/-	Legend

The Improved "Calculex"

(PATENT)

Or Slide Rule Calculator



No. 1092

No. 1092—Complete in case with Book of Instructions, containing formula and data, for Engineers, Surveyors, Architects, Builders, Business Men, &c.

Price

12/6

Code Word

Leisure

For description, see page 133

Description

Briefly described, it consists of a disc within a ring, together forming a dial with logarithmic scales on both sides; it is surrounded by a metal ring and protected on each side by a glass disc with a cursor line marked radially thereon, and is capable of being revolved by the two thumbs when it is required to set the cursor line. The disc is also turned in setting the scales to the required position by holding the nuts on either side, between the thumb and finger, the ring being fixed to the metal ring.

Advantages

It combines all the advantages of the Slide Rule with those of the Pocket Calculator.

It is only $\frac{1}{4}$ in. thick and is very neat and compact.

It may always be at hand, being carried in the waistcoat pocket without the slightest inconvenience.

Being in a circular form the reading is continuous without any break or end.

The Cursor Lines are very fine and very close to the dial and ensure great accuracy in reading.

Most calculations are made with only one setting.

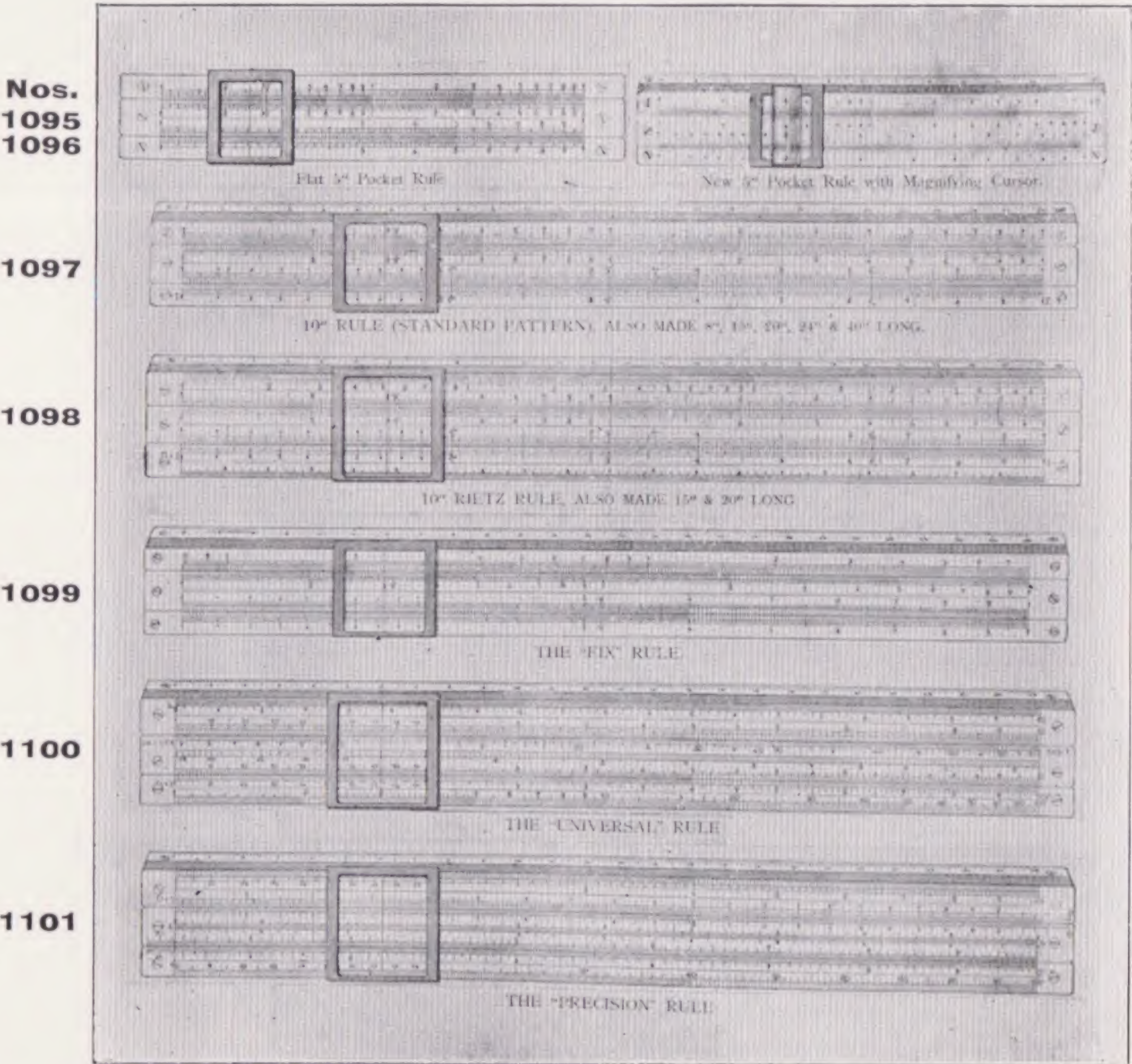
It gives a great range of proportions at each setting all in that ratio.

If the accuracy of the setting is doubtful it can be referred to at any time.

The scales for inverse proportions are close together, and can be set and read without the Cursor.

Special Dials can be inserted.

Slide Rules



These Rules are engine divided, not printed. The movement of the slide is smooth and even, and is not affected by atmospherical variations, owing to its special construction. All parts are kept dull to avoid straining the sight. A book of instructions is supplied with each slide rule.

For prices see page 135.

Slide Rules

(The prices quoted include a Book of Instructions.)

	Price	Code Word
	£ s. d.	
No. 1095—5in. Flat Pocket Rule	0 6 0	.. Lene
No. 1096—5in. New Pocket Rule, with magnifying cursor ..	0 9 6	.. Lenos
No. 1097—10in. Standard Pattern	0 10 6	.. Lenity
No. 1098—10in. Reitz Rule	0 13 6	.. Lenten
No. 1099—The "Fix" Rule	0 15 0	.. Lemo
No. 1100—The "Universal" Rule	0 19 0	.. Lepus
No. 1101—The "Precision" Rule	1 0 0	.. Lesion

For illustrations of above, see page 134

No. 1102—Faber's Improved Slide Rule, 11in. long, metal-framed, improved indicator, automatic adjustable springs. Complete, with 42-page Book of Instructions and 14 sheets of illustrations	0 15 0	.. Lethe
No. 1103—Tacheometer Slide Rule, Nestler's, 10in., in case, with instructions	0 17 6	.. Legume
No. 1104—Do. do. Gravet's, 16in., centesimally divided	2 5 0	.. Legumen
No. 1105—Stadia Slide Rule, 10in., in case, with instructions	1 0 0	.. Lemma
No. 1106—Book of Instructions for Slide Rules	0 1 0	..
<hr/>		
No. 1109—Thacher's Slide Rule, consists of two logarithmic scales, one on the internal cylinder, and the other on the external bridges. With Book of Instructions	7 10 0	.. Lessee
No. 1110—Do. do. with Adjustable Reading Glass	9 5 0	.. Lessen
No. 1111—Professor Fuller's Calculating Slide Rule, equal to a slide rule 83ft. long, giving logarithms, multiplication, division, &c. results, in four or five figures. Complete, in mahogany case, with instructions	3 0 0	.. Lessor
No. 1112—Fuller-Bakewell Tacheometrical Slide Rule	4 10 0	.. Levator

Surveyors' Rods or Laths



No. 1117

		Price	
No.	Description	Each	Per pair
No. 1116	Boxwood, folding, with spring top joint, marked feet, inches, and 8ths	5ft. 4/6	8/-
		6ft. 5/6	10/-
No. 1117	Do. do. painted black with white figures	5ft. 5/6	10/-
		6ft. 6/6	12/-
No. 1118	Straight, 5ft. long, without joint, 1in. x 1/2in. ... Boxwood	3/6	6/-
	Black (white figures)	4/6	8/-
No. 1119	Solid leather cases to hold a pair of Jointed Rods .. 5ft.	6/6	—
	6ft.	7/6	—

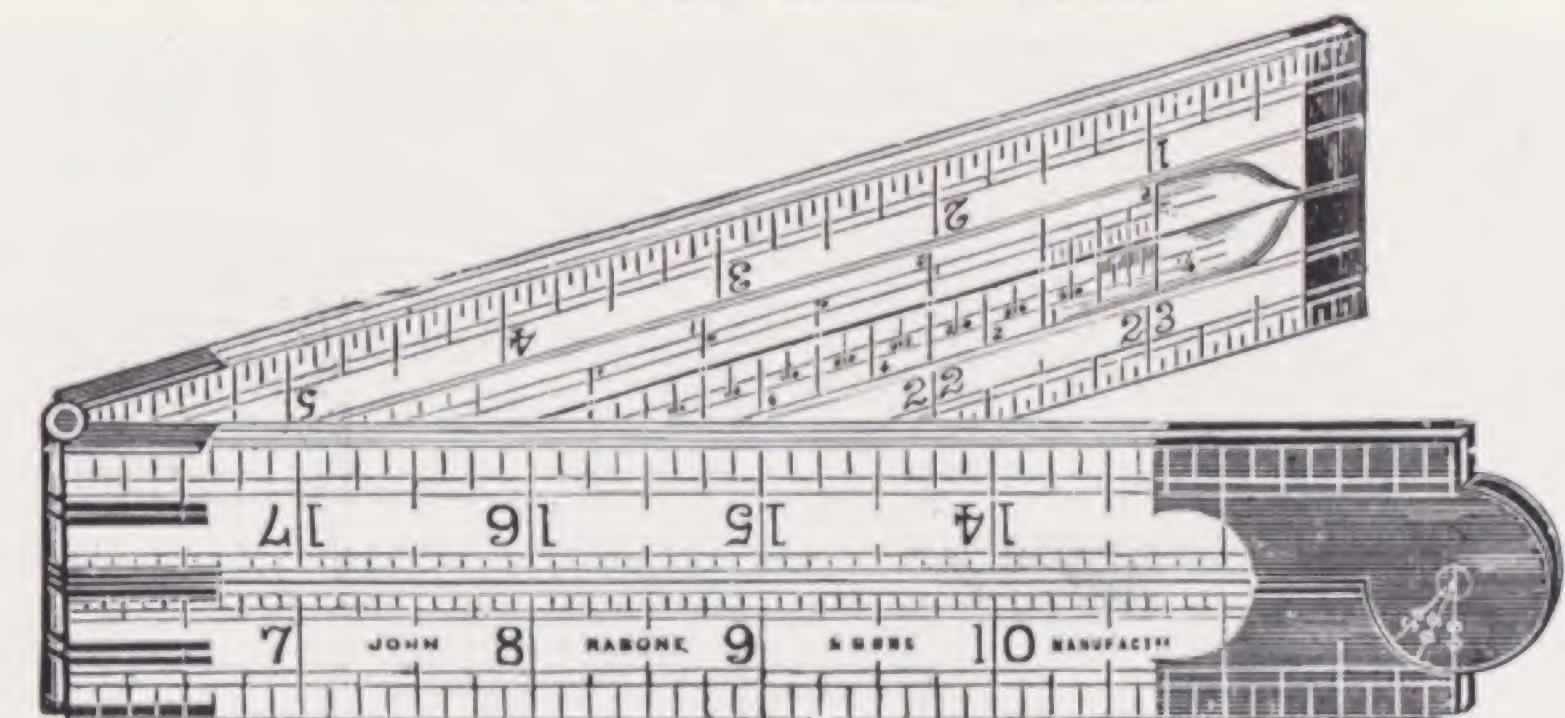
Boxwood Rules

No.	Description	Price
No. 1122	2ft. Four Fold Boxwood Rule, 1 1/2in. wide, marked inches, 8ths, 16ths, 10ths and 12ths, arch joint	1/-
No. 1123	2ft. Four Fold Boxwood Rule, 1 1/2in. wide, marked inches, 8ths and 16ths, with protractor joint and extra scale	1/6
No. 1124	2ft. Four Fold Boxwood Rule, 1 1/2in. wide, edges bound brass full length, marked inches, 8ths, 16ths, 10ths and 12ths	2/-
No. 1125	12in. Pocket Rule, folding to 3in., 3/4in. wide, marked inches, 8ths and 16ths, square joint	1/-
No. 1126	12in. Pocket Rule, folding to 3in., 3/4in. wide, with brass edge plates, marked 8ths, 16ths, 10ths and 12ths, arch joint	1/6

Boxwood Caliper Rules

No. 1129	6in. Caliper Two Fold Boxwood Rule, folding to 3in., square joint, marked 8ths, 16ths, 32nds and 10ths	1/6
No. 1130	12in. Caliper Four Fold Boxwood Rule, folding to 3in., arch joint 1in. wide, marked 8ths, 16ths, 32nds and 10ths	2/6

Four Fold Scale Rule

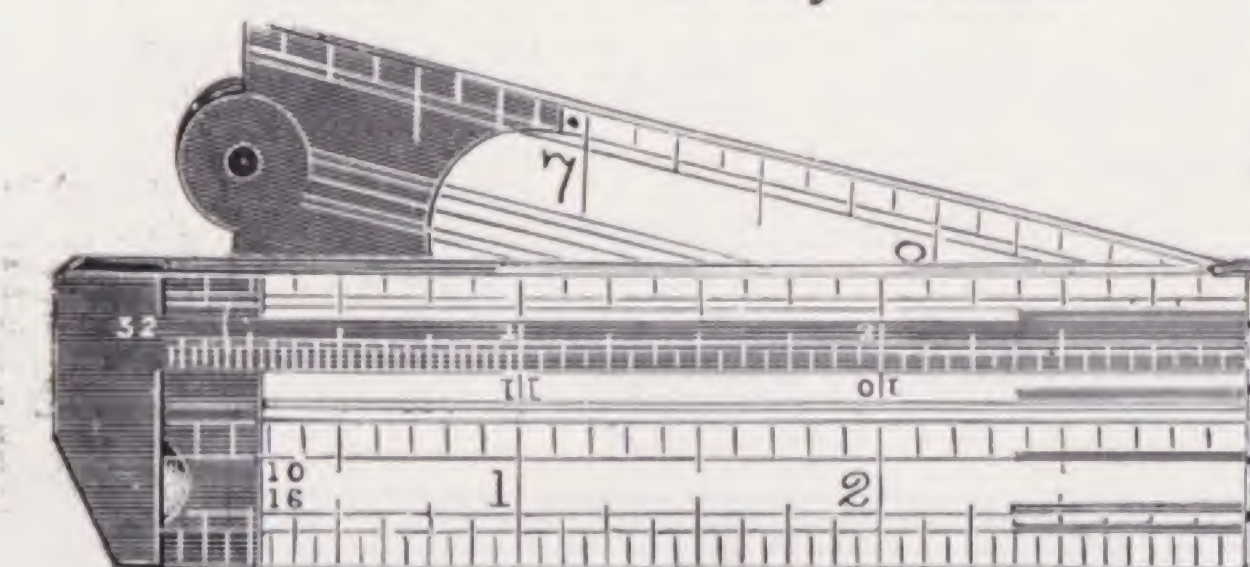


No. 1134

These Rules are particularly suitable for architects, builders, carpenters, and others drawing from plans, having inside edges bevelled and marked with various drawing scales.

No.	Description	Price
No. 1132	2ft. Scale Rule, 1in. wide, marked inches, 8ths, 16ths, 10ths, and 12ths. Edge plates, arch joints, inside bevelled edges marked with 8 scales ..	2/-
No. 1133	2ft. Scale Rule, 1 1/2in. wide, German silver protractor arch joint, and small folding joint, marked inches, 8ths, 10ths, and 12ths. Inside bevelled edge marked with 16 scales	4/6
No. 1134	2ft. Scale Rule, 1 1/2in. wide. Arch brass protractor joint, inserted spirit level, marked inches, 8ths, and 16ths. Scaled 1/4, 1/2, and 3/4 on inside bevelled edges	4/6

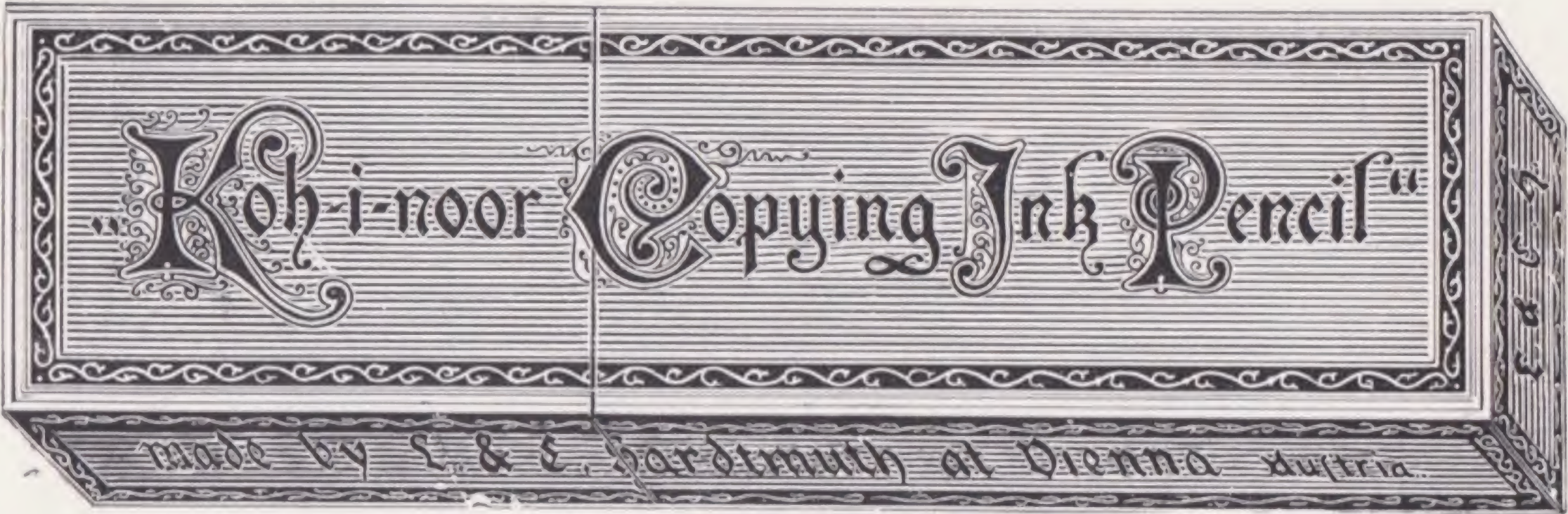
Four Fold Ivory Rules



No. 1137

No. 1135	12in. Arch joint, German silver mounts, 3/4in. wide, divided 8ths, 10ths, 12ths, and 16ths	6/-
No. 1136	24in. do. do. do.	17/6
No. 1137	12in. do. do. do. with caliper gauge	12/6
No. 1138	24in. do. do. 1in. wide, divided 8ths, 16ths, 10ths, and 12ths. Inside edge bevelled, with 16 useful scales	£1 2 6

Pencils



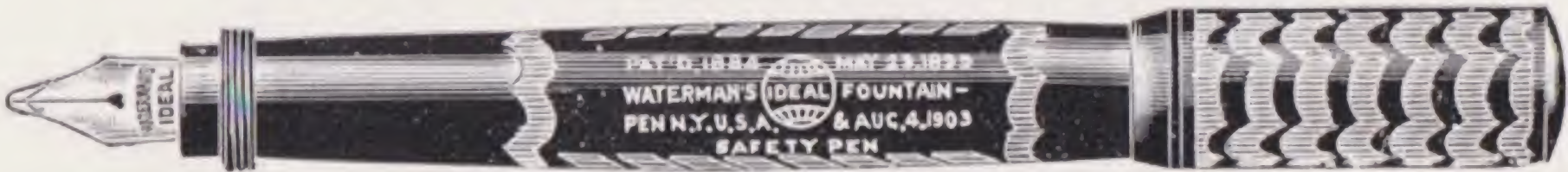
No. 1142

No. 1140—Hardtmuth's "Koh-i-noor" Compressed Lead, hexagon, yellow polished cedar, gold stamped, 17 degrees, 9H, 8H, 7H, 6H, 5H, 4H, 3H, 2H, H, F, HB, B, 2B, 3B, 4B	per doz.	per gross.
5B, 6B	3 6	£ s. d.
No. 1141—Hardtmuth's "Koh-i-noor" Rubber Tipped	4/-	1 19 0
No. 1142—Hardtmuth's "Koh-i-noor" Copying Pencil	5/-	2 5 0
No. 1143—Hardtmuth's "Mephisto" Copying Pencil, with or without red tips	3/6	2 15 0
No. 1144—School Rubber Tipped, HB	1/9	2 0 0
No. 1145—Johann Faber's Drawing Pencil, round natural polish, silver stamped, 10 degrees, 4B to 4H	1/6	1 0 0
No. 1146—Pencils to fit compasses and spring bows	1/-	0 15 0
No. 1147—Box of Leads for compasses, two sizes	6d.	0 10 0
per box		6d. and 1s.

Waterman's Ideal Fountain Pen

No. 1148—Plain, Chased, or Mottled	each	10/6
Prices for other styles sent on application.		

Waterman's Safety Fountain Pen



No. 1149

Waterman's Unleakable Fountain Pen. Can be safely carried in any position in pocket, purse, or trunk.			
No. 1149—Plain, Chased, or Mottled	each	12/6	15/-
No. 1150—Waterman's Fountain Pen Ink, put up in portable unbreakable cases, especially suitable for travellers and others			20/-
			1/-

Rubbers



No. 1155

Hardtmuth's Pliable Rubbers

No. 1155—Grey or Pink Rubber.	
Per piece	6d. and 9d.
Per pound	4/6

A. W. Faber's Rubbers

No. 1156—Artists' Rubber.	
Per piece	6d. and 1/-
Per pound	10/-
No. 1157—Ink Eraser, per piece	4d., 8d., and 1/-
No. 1158—Ink and Pencil Eraser in wood	each 6d.
No. 1159—Ruby Erasers	3d.
No. 1160—Sponge Rubber, adapted especially for cleaning drawings without removing pencil marks.	
Per piece	1/3; per pound, 18/-
No. 1161—Wedge Rubber.	
Pieces to the pound	10 20 30 48
Per piece	8d. 4d. 3d. 2d.
Per pound	5/-

Steel Erasers

	Price
No. 1162—Steel Erasers, with long blade, bone handle	1/6
No. 1163—Do. do. cocoa do.	1/3
No. 1164—Do. with short blade, bone handle	1/3
No. 1165—Do. do. cocoa do.	1/-

Best Rubber Bands

No. 1166—Rubber Bands, one gross, assorted sizes	2/- and 3/-
--	-------------

Paper Fasteners

No. 1167—Paper Fasteners, in gross boxes, assorted	each 6d., 1/-, 1/6
--	--------------------

Steuber's Waterproof Drawing Inks

We confidently recommend this ink.

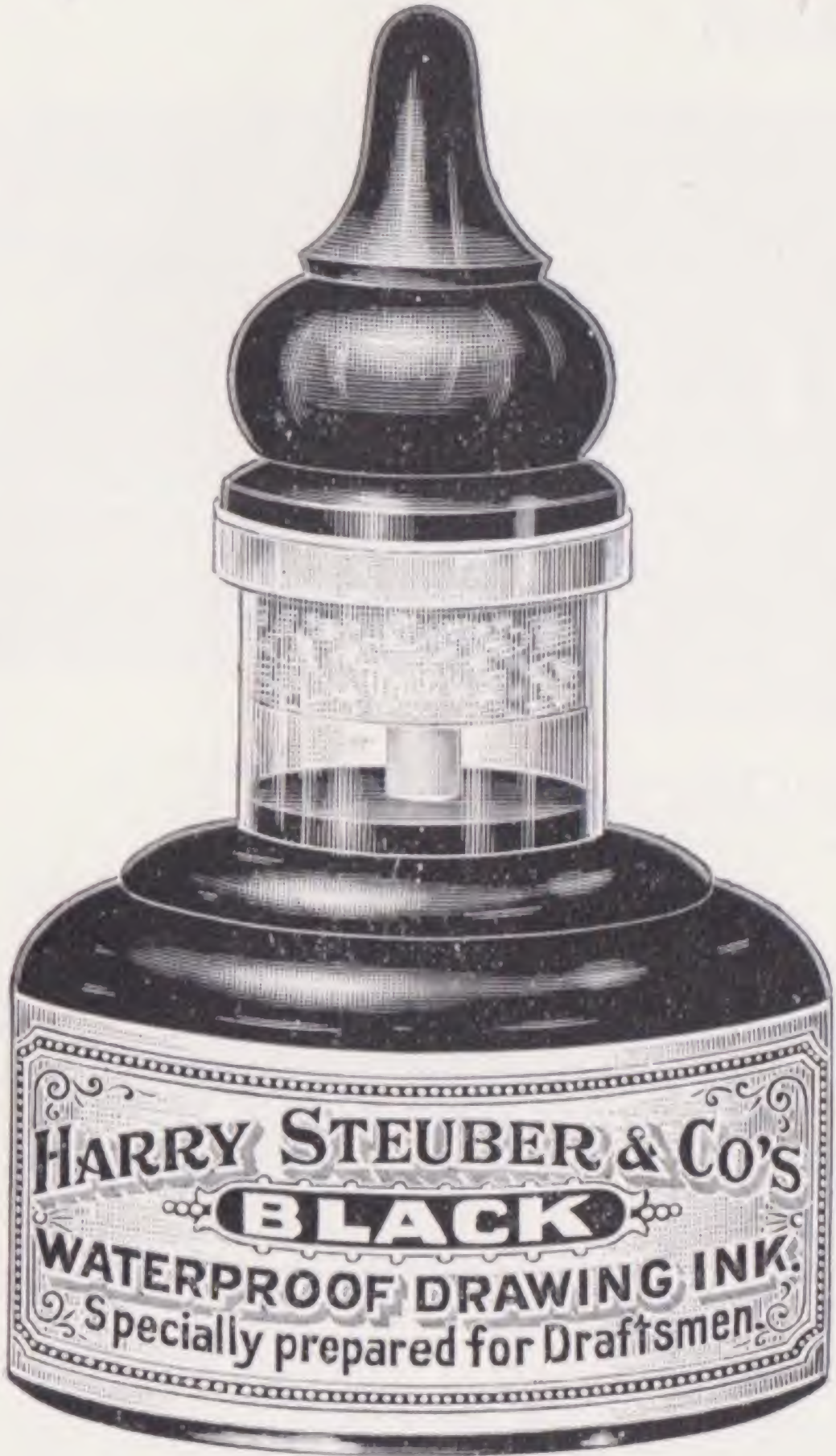
The Manufacturers have received the following unsolicited testimonials, which prove the popularity this ink has already gained amongst professional men.

J. A. FAY & EGAN CO., Cincinnati, O.:—"and would say that we have found it a most excellent ink in our Drawing Office. We would like to know where it can be procured in the U.S."

ROLLINSON & SON, Architects, Chesterfield:—"We have pleasure in stating that your Drawing Ink is the best we have used."

No. 1169—Black, Brick Red, Yellow, Green, Vermilion, Brown, Carmine, Orange, Indigo, Burnt Sienna, Prussian Blue, Scarlet, Violet.

Sizes, ozs.	1	8	16
Price each	9d.	5/-	9/6



No. 1169

No. 1170—Steuber's White Waterproof Drawing Ink. Can be used to correct or write on Blue prints. A necessity in every drawing office.

1 oz. size, with filler, 9d.

Higgins' Ink

No. 1171—Black (Waterproof), Black (General), Carmine, Scarlet, Vermilion, Brick Red, Blue, Green, Violet, Indigo, Brown, Yellow, Orange.

Sizes, ozs.	3/4	8	16
Price each	9d.	6/3	11/6

Gillott's Artists' Pens



Nos. 1176 1177 1178 1180 1183 1184

		Per card of 12, with holder	Per box of 3 doz.	Per box of 1 gross
No. 1176—Principality	(1)	—	1/3	4/3
No. 1177—Mapping, extra fine point	(170)	6d.	10d.	2/9
No. 1178—Lithographic pen, for use on stone	(290)	1/8	3/9	14/-
No. 1179—Mapping, Drawing, and Engineering Pen	(291)	1/8	4/-	17/6
No. 1180—Lettering Pen	(303)	—	1/3	4/3
No. 1181—Do. do.	(404)	—	6d.	1/9
No. 1182—Extra Fine Point	(601 EF)	—	1/0	3/6
No. 1183—Crow Quill	(659)	1/6	4/3	15/-
No. 1184—Superfine Drawing Pen ..	(1000)	3/-	8/-	30/-
No. 1185—Gillott's Ebony Holder, for No. (659) 1183 pen	(667)	—	—	15/-
No. 1186—Do. do. to fit any of the above pens		—	—	7/6



Brandauer's Pens

Brandauer's Double Line Pens.

(Nos. 600, 601, and 602.)

No. 1187—Assorted.. .. per doz. 8d.
per gross 6/6

No. 1188—F. Soennecken's Round Writing Pens, 25 assorted pens in a box, with ink holder Price 1/6
No. 1189—Automatic Shading and Marking Pens each 1/-

Winsor & Newton's Water Colors, in Cakes, Pans,
and Tubes

SIZE OF WHOLE CAKE



SIZE OF HALF PAN

No. 1195—Whole Cake or Pan, 9d.

Half Cake or Pan, $4\frac{1}{2}$ d.

Tube, 9d.

Antwerp Blue
Bistre
Blue Black
*British Ink
*Bronze
Brown Ochre
Brown Pink
Burnt Sienna
Burnt Umber
Charcoal Grey
‡Chinese White
Chrome, Deep
Chrome, Lemon
Chrome, Orange
Chrome, Yellow
Cologne Earth
*Constant White

Dragon's Blood
Emerald Green
Flake White
Gamboge
Hooker's Green No. 1
Hooker's Green No. 2
Indian Red
Indigo
Italian Pink
Ivory Black
King's Yellow
Lamp Black
Light Red
† Mauve
Naples Yellow
Neutral Tint
New Blue

Olive Green
Payne's Grey
Permanent Blue
Prussian Blue
Prussian Green
Raw Sienna
Raw Umber
Roman Ochre
Sap Green
Terre Verte
Vandyke Brown
Venetian Red
Vermilion
Yellow Lake
Yellow Ochre

No. 1196—Whole Cake or Pan, 1/2

Half Cake or Pan, 7d.

Tube, 1/2

Alizarin Crimson
Alizarin Green
Alizarin Orange
Alizarin Scarlet
Alizarin Yellow
*Black Lead
Brown Madder
Carmine Lake

Cerulean Blue
Crimson Lake
Indian Yellow
Leitch's Blue
Mar's Yellow
Neutral Orange
Orange Vermilion
†Permanent Brown

Purple Lake
Roman Sepia
Ruben's Madder
Scarlet Lake
Scarlet Vermilion
Sepia
Warm Sepia

No. 1197—Whole Cake or Pan, 1/6

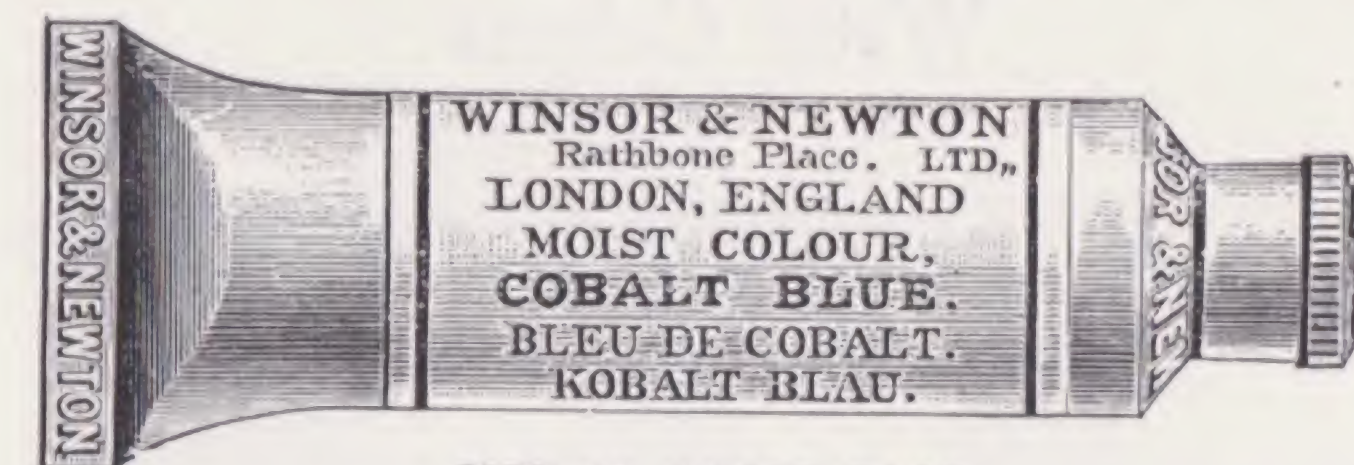
Half Cake or Pan, 9d.

Tube, 1/6

Cadmium Orange
Cadmium Yellow, Pale
Cadmium Yellow
Cobalt Blue
Cobalt Green
† Emerald Oxide of Chrome

French Blue
Indian Purple
‡ Intense Blue
Lemon Yellow
Mar's Orange
Oxide of Chromium
† Do. Transparent

Permanent Mauve
Permanent Violet
† Pure Scarlet
† Ultramarine Ash-Grey
Violet Carmine
Viridian

Winsor & Newton's Water Colors—*Continued*

SIZE OF WHOLE TUBE

No. 1198—Whole Cake or Pan, $\frac{2}{3}$

Half Cake or Pan, 1/2

Tube, 2/3

Aureolin
Aurora Yellow
Burnt Carmine
Field's Orange Ver-
milion
Gallstone

Madder Carmine
Madder Lake
Pink Madder
Primrose Aureolin
Purple Madder
Rose Dorée

Rose Madder
†Rose Madder, Pink
shade
Scarlet Madder
Yellow Carmine

No. 1199—Whole Cake or Pan, 3/6

Half Cake or Pan, 1/9

Tube, 3/6

Smalt

Ultramarine Ash-Blue

No. 1200—Quarter Cake only

Genuine Ultramarine 5/6



Those marked * are made in Cakes only
Those marked † are made in Pans only
Those marked ‡ are NOT put up in Tubes

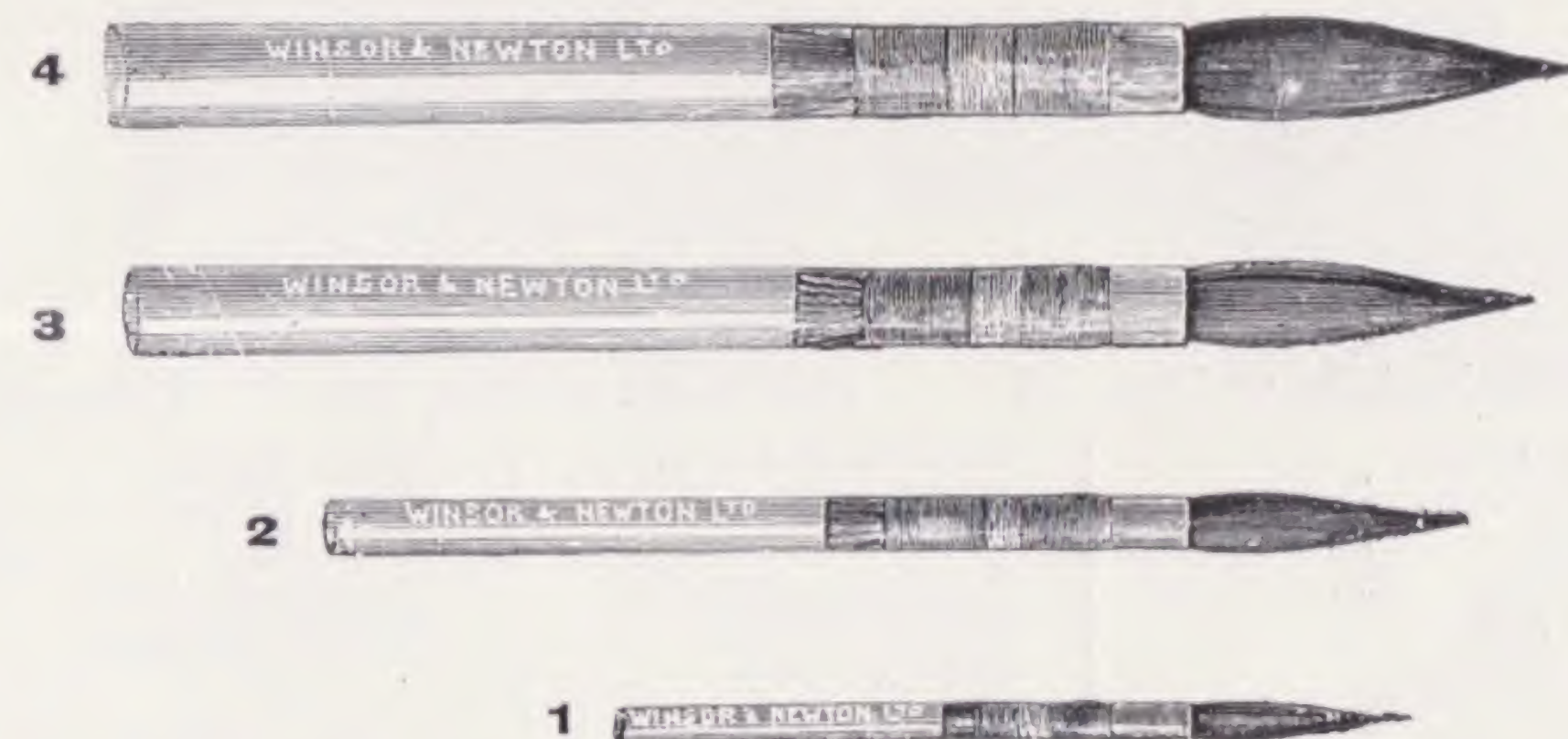
Winsor & Newton's Water
Color Liquids

No. 1201—I, Chinese White

2. Indian Ink
3. Oxgall
4. Gold Ink
5. Carmine
6. Indelible Brown Ink
7. Prout's Brown
8. Sepia
9. Prussian Blue

Price each 1/-

Winsor & Newton's Brushes for Painting in Water Colours



No. 1205—Red Sable in Quill.

Nos. 1	2	3	4	5	6	7	8
Price 3d.	4d.	7d.	8d.	10d.	1/9	2/4	3/- each.

No. 1206—Camel Hair in Quill (Nos. 4 to 7 in long quills).

Nos. 1	2	3	4	5	6	7
Price 5d.	7d.	1/-	4/6	7/6	10/6	13/- per doz.

No. 1207—Red Sable in Albata.

Nos. 1	2	3	4	5	6	7	8	9	10	11	12
Price 6d.	7d.	8d.	10d.	1/-	1/3	1/6	2/3	3/6	5/-	7/-	8/6 each.

No. 1208—Camel Hair in Tin Ferrule, 6in. black polished handle.

Nos. 1	2	3	4	5	6
Price 1/-	1/-	1/2	1/3	1/4	1/6 per doz.

No. 1209—Double Ended Camel Hair Brush in Tin Ferrule, yellow polished handle.

Nos. 6 and 8	.. 4d.	..	Nos. 9 and 13	.. 6d.
Nos. 7 and 10	.. 4d.	..	Nos. 10 and 14	.. 7d.
Nos. 8 and 12	.. 6d.	..	Nos. 11 and 15	.. 8d.

Sable and Camel Hair Brushes are liable to fluctuation in prices.

Japanned Tin Cases for Plans and Drawings With Padlocks

No. 1210—22in. x 3 1/2in. diam.	.. 5/9	No. 1214—42in. x 4 3/4in. diam.	.. 9/-
No. 1211—31in. x 4 1/2in. diam.	.. 7/6	No. 1215—54in. x 5in. diam.	.. 11/-

China Saucers



No. 1215

No. 1215—Cabinet nest of 4 China Saucers and Cover

Sizes	2 3/8	2 3/4	3 3/8	3 3/4 ins.
Price	10d.	1/-	1/3	1/6

No. 1216—China Saucers, with notches 2 1/2in. 1/3 per doz.

No. 1217— " " " " " " " " " " " " 3in. 1/6 "

No. 1218— " " 4 divisions " " " " " " " " 2/6 "

No. 1219—Architect's Slant and Basin, 8 divisions and cup 7in. diam. 2/6

No. 1220—Ink and Colour Slabs, 3 wells and slope, 4in. by 2 1/2in. 4d. each

No. 1221— " " " " 3 wells and 3 slopes, 4 1/4in. by 2 1/2in. 6d. "

No. 1222— " " " " 5 wells and 5 slopes, 7 1/2in. by 4 3/8in. 1/- "

No. 1223—Sloping Tiles, 3 divisions.. .. . 4d. "

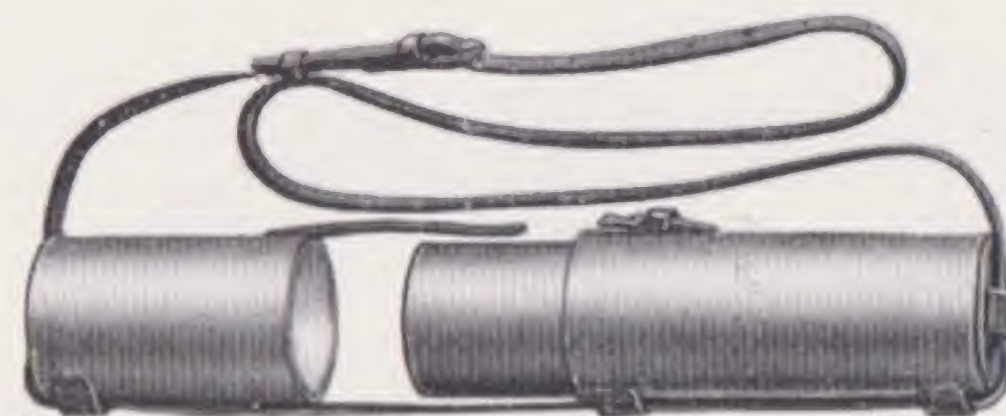
No. 1224— " " 4 divisions.. .. . 7d. "

No. 1225— " " 5 divisions.. .. . 8d. "

No. 1226— " " 6 divisions.. .. . 9d. "

Telescopes

For Sporting and Military Purposes



No. 1231

We are stocking two patterns, but other patterns and sizes can be supplied to order.

Description	Mag. Power	O.G. Aperture	No. of Draws	Length—Open	Length—Closed	Price	Code Word
No. 1230—The "Sportsman" ..	15	1 $\frac{1}{4}$ in.	2	23 $\frac{1}{4}$ in.	10 $\frac{1}{4}$ in.	£3 0 0	<i>Pean</i>
No. 1231—Large Aperture ..	20	1 $\frac{3}{4}$ in.	3	30 $\frac{1}{2}$ in.	10 $\frac{1}{4}$ in.	5 0 0	<i>Pent</i>

These prices include a Solid Leather Sling Case.

Ross' "Service" Binocular

This Binocular is the same Glass that is supplied by Ross, Ltd., to the British and Indian Governments in enormous quantities. **A special feature of the Glass is the newly-computed Optical System, whereby increased brilliancy and definition have been obtained.**

The Glass has 12 Lenses, and has a magnification of 5 diameters. Aperture of Object Glass, 1 $\frac{1}{8}$ in.

The price includes a Solid Leather Sling Case.

No. 1232, Price, £3 7 6. Code Word, *Paca*.

No. 1233—As No. 1232, but with "Bending Bars." Price, £3 10 0
Code Word, *Pali*.

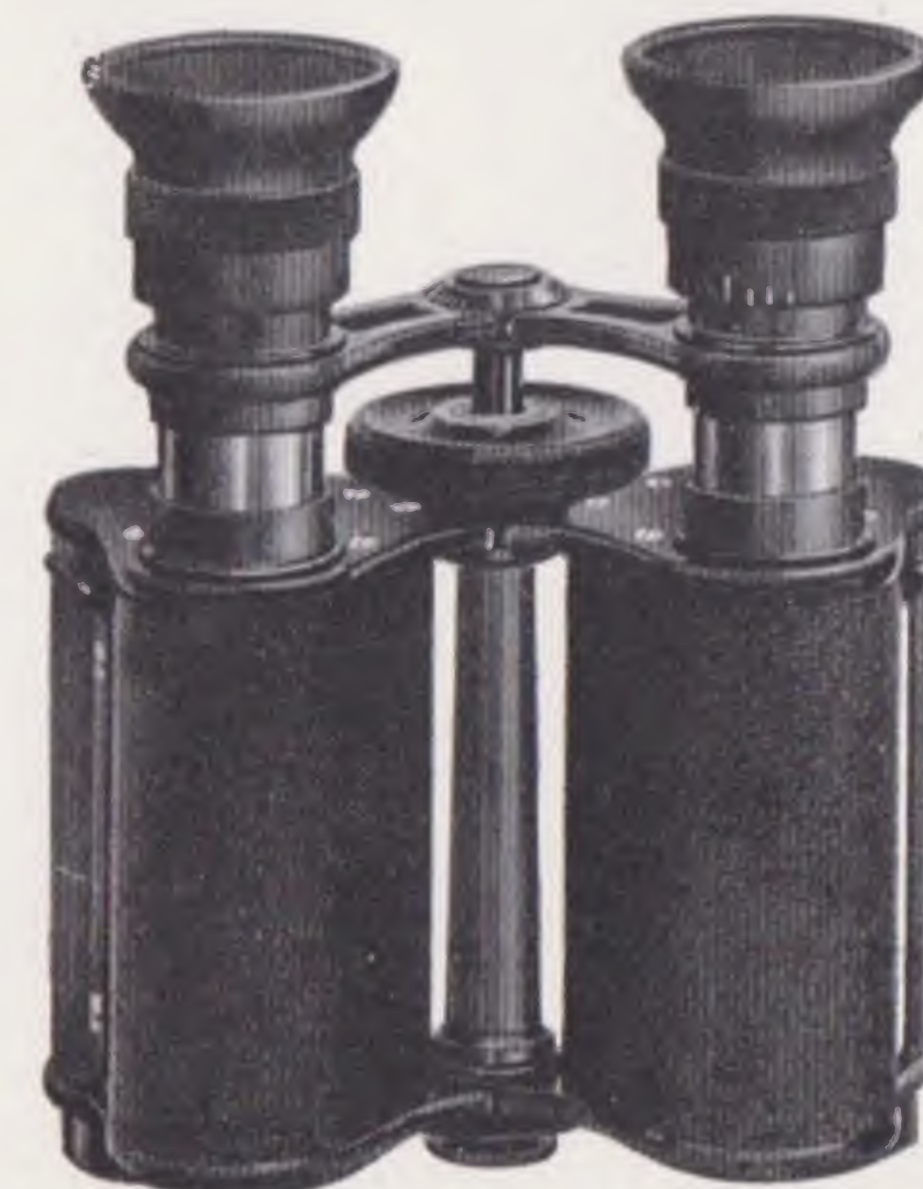
Ross' New Model Stereo Prism Binoculars

Large Apertures. Increased Field

No.	Magnification	Price	Code Word
No. 1234	× 6	£7 10 0	<i>Steopach</i>
No. 1235	× 8	£7 10 0	<i>Stepoct</i>

Patent New Model Ross' Prism Binocular Glasses

These Glasses have the power of a telescope in the compass of an opera glass. **They are specially suitable for use in countries where a clear atmosphere generally prevails.**



Nos. 1236—1238

With simultaneous Focussing adjustment and one adjustable eyepiece, as illustrated.

No.	Magnification	Diameters	Size Height and Width	Weight	Price	Code Word
No. 1236	8	..	4 $\frac{1}{2}$ in. × 3 $\frac{3}{4}$ in.	150z.	£6 10 0	<i>Proof</i>
No. 1237	10	..	5 in. × 3 $\frac{3}{4}$ in.	160z.	7 10 0	<i>Prop</i>
No. 1238	12	..	5 $\frac{1}{2}$ in. × 3 $\frac{3}{4}$ in.	170z.	8 10 0	<i>Prose</i>

We also stock the 8-diameter-power Glass with separate adjustment to each eyepiece, but without simultaneous focussing adjustment, at £5 10 0—code word, "*Poet*"—the weight being 2 oz. less.

Patent New Model (Large Aperture) Ross' Prism Binocular Glass

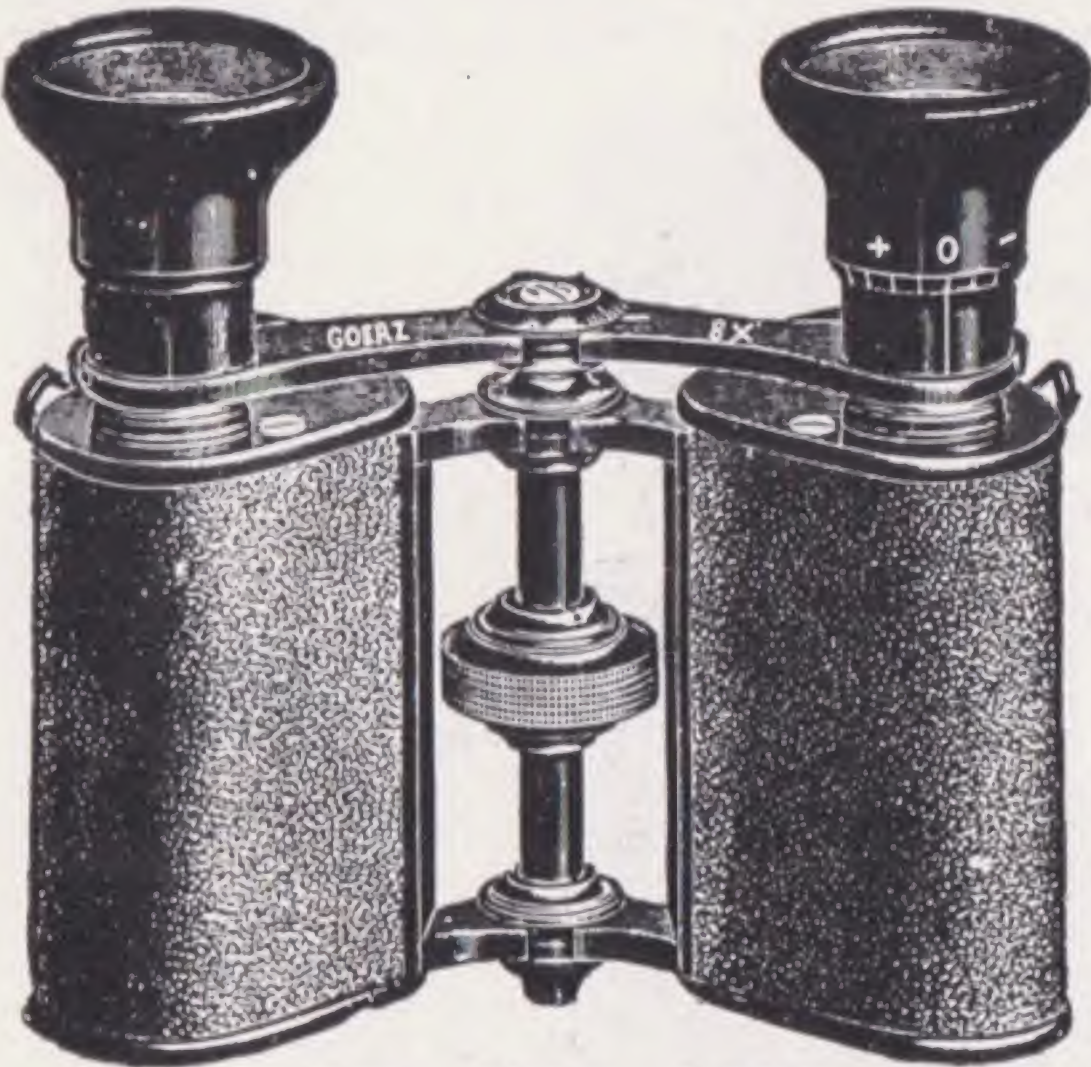
This Glass has been introduced to meet the demand for a Prism Glass of large aperture specially suitable for marine use. The Binocular has a magnifying power of 6 diameters, and object glasses of 1 $\frac{3}{8}$ in. clear aperture, which allows of the passage of a large amount of light; so the Glass is not only **useful for marine purposes**, but **also makes an excellent night glass.**

The focussing is effected by adjustment of the eyepieces.

No. 1240—Price £8 10 0 Code Word, "*Pull*"

A best quality leather sling case is supplied with each Binocular.

Goerz "Pagor" Binoculars

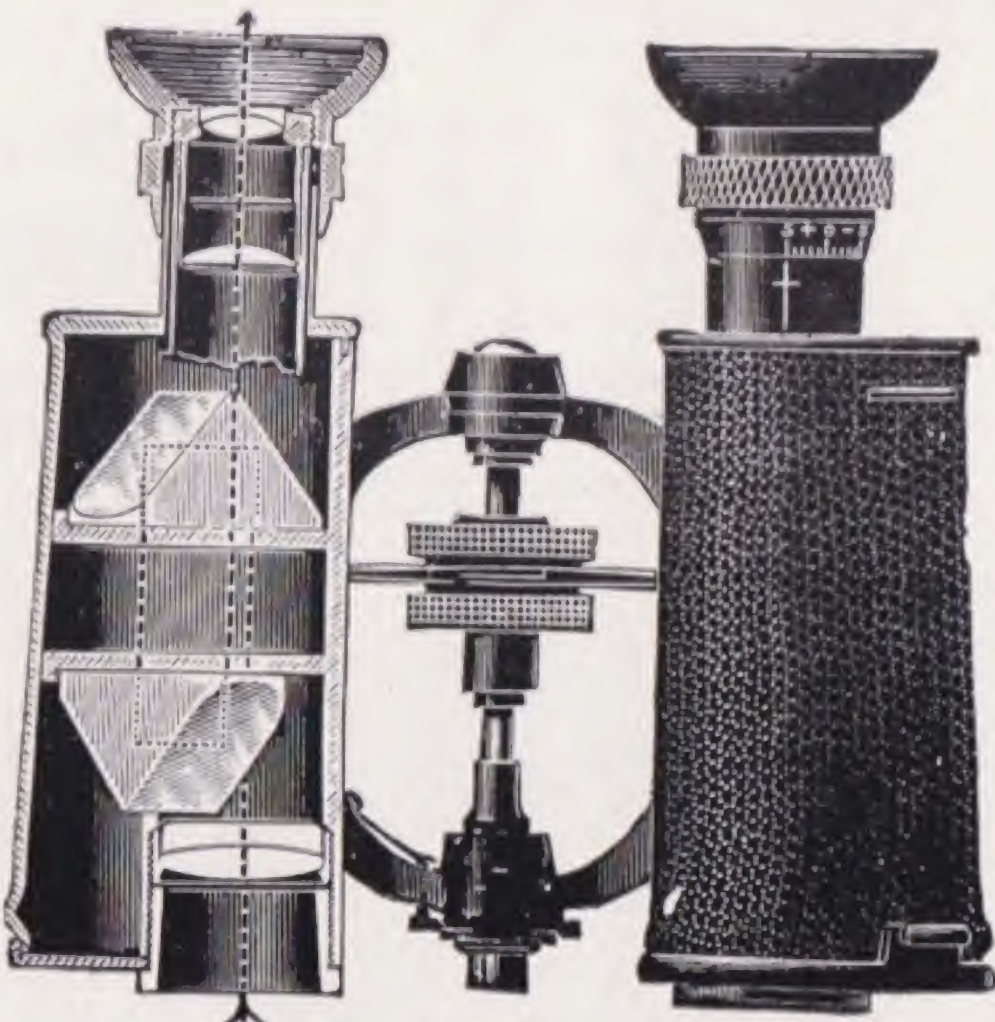


Nos. 1245-1247

- Code Word**
- No. 1245—Magnification $\times 6$,
weight 10 ozs., **£6 10 0** *Perbus*
- No. 1246—Magnification $\times 8$,
weight 10½ ozs., **£7 0 0** *Pergon*
- No. 1247—Magnification $\times 10$,
weight 11 ozs., **£8 0 0** *Perga*

Either a buff-coloured leather case of the usual English style or a crocodile pattern case can be supplied.

Goerz "Army" Binocular



Nos. 1250-1252

The "Army" Binocular can be confidently recommended **for tropical use**, as every surface of the lenses or prisms is accessible for cleaning—of no little importance in hot moist climates where the prisms are apt to dull rather quickly.

In leather sling case.

- Price**
- | | £ | s. | d. |
|------------------------------|----|----|----|
| No. 1250—Magnifying 6 diams. | 7 | 0 | 0 |
| No. 1251— " 9 " | 7 | 15 | 0 |
| No. 1252— " 12 " | 10 | 0 | 0 |

Zeiss Binoculars

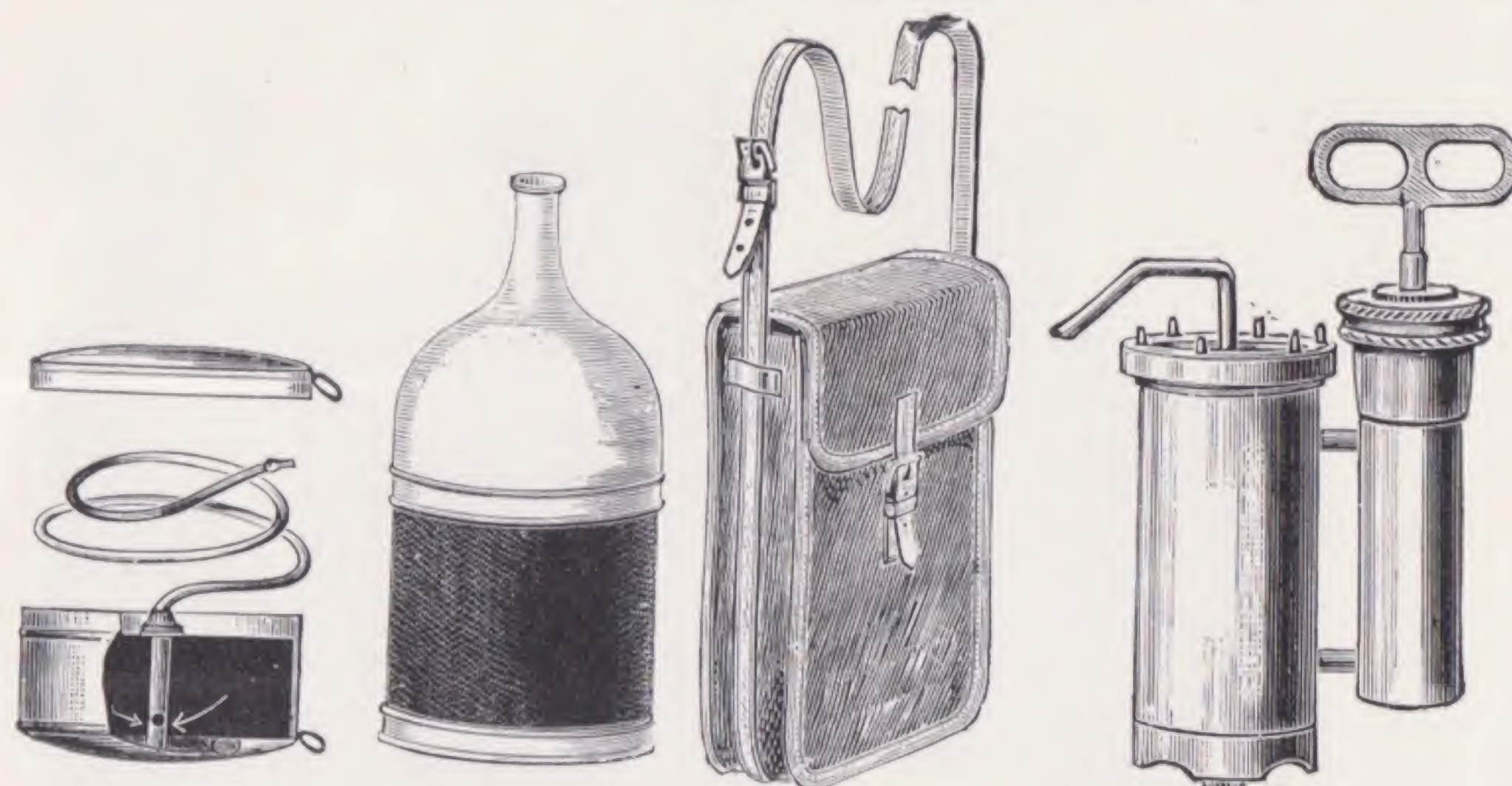


These Glasses combine an extraordinary large field of view, with greatest possible illumination and perfect definition. In addition, their construction entirely precludes the intrusion of dust and damp into the interior, rendering them "fungus-proof," and, therefore, **of inestimable service in the Tropics.**

	Weight	Price			Code Word
		£	s.	d.	
No. 1255—Magnification $\times 6$	15ozs.	6	0	0	<i>Telex</i>
No. 1256— " $\times 8$ Light Model	17ozs.	6	10	0	<i>Telactal</i>
No. 1257— " $\times 8$	20ozs.	6	10	0	<i>Telact</i>
No. 1258— " $\times 6$ Stalking	23ozs.	7	10	0	<i>Silvamar</i>
No. 1259— " $\times 12$	23ozs.	9	5	0	<i>Telefort</i>

The above prices include a stiff leather case with sling. They can also be supplied in soft calf-skin pocket pouch at 3/- each less.

Filters For Explorers, Travellers, &c.



No. 1262

No. 1263

No. 1264

No. 1262—Syphon Filter, designed by Major Fraser, R.E. By means of this Filter, water may be drunk from any pond or stream by simply immersing the Filter therein, and drawing the water through the tube by suction.

It may also be used as a Syphon by placing it in a vessel of water, then drawing the water by the mouth, and allowing the flexible tube to hang over the side below the Filter.

They are readily cleaned from sedimentary matter.

3½ in. diameter, nickel-plated, metal mouth-piece

No. 1263—Porous Bottle Filter, with white china top and bottom, and silicated carbon body. A cheap, handy Filter for use in Tropics, &c.

The Filter in use is placed in water, which percolates through the silicated carbon from the outside to the inside.

When filled it acts as a refrigerator by evaporation, leaving the filtered water deliciously fresh and cool .. 1 quart, 4/-; 2 quarts, 5/-;

3 quarts

No. 1264—Dahlke's Nickel-plated Folding Pump Filter, strong, compact, efficient, microbe and toxine proof; size when folded 8 in. x 5 in.; weight under 4 lbs.; complete in bag

Extra Needles for No. 1264 (the needles are very strong and can easily be taken out, sterilised by boiling, and replaced) .. each

Price
£ s. d.

Code
Word

0 5 6 .. Syphon

0 6 0 .. Porous

2 17 6 ..

0 5 6 .. Dahlke

Scientific Books

		Price
No. 1270.—Aneroid Barometer, The, how to use it	—	6d.
No. 1271.—Astronomy, Treatise on	Godfrey	12/6
No. 1272.—Civil Engineer's Pocket Book, 12mo., 1,100 pp., Tucks'	J. C. Trautwine	21/-
No. 1273.—Curve Tables	Kennedy & Hackwood	2/6
No. 1274.—Earthwork Tables	Crandall	8/-
No. 1275.—Engineer's Year Book.	Kempe	8/-
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